5-4120-367-14

DEPARTMENT OF ARMY TM 5-4120-367-14
TECHNICAL MANUAL
MARINE CORPS TM 07592B-14/1
TECHNICAL MANUAL

TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

AIR CONDITIONER, HORIZONTAL, COMPACT, 18,000 BTU/HR COOLING

MODEL	POWER	NSN
F18H	230V, Single Phase, 50/60 Hertz	4120-00-411-3729
F18H-3	208V, 3 Phase, 50/60 Hertz	4120-01-076-1753
F18H-4	208V, 3 Phase, 400 Hertz	4120-00-411-3731

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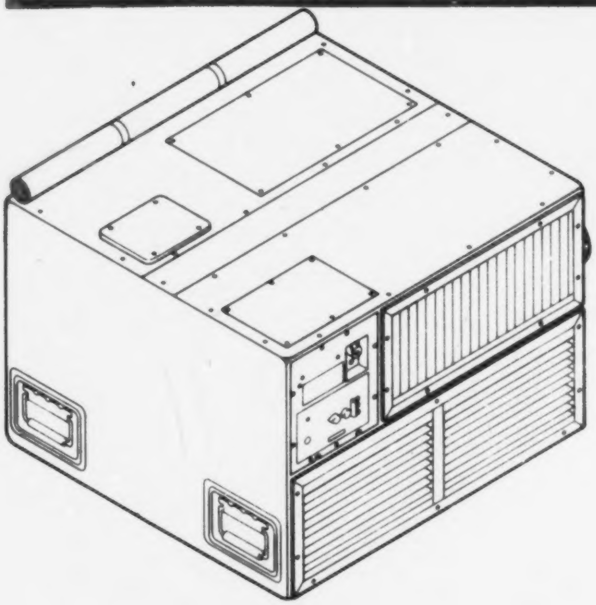

24 NOVEMBER 1980

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Operating Instructions
Repair Parts, Service and Preventive Maintenance
Troubleshooting
Organizational Maintenance
Direct and General Support Maintenance
Preparation for Storage or Shipment
References
Components of End Item List
Expendable Supplies And Materials List
Maintenance Allocation Chart
Tools and Test Equipment
Torque Limits
Alphabetical Index

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CHANGE No. 3

HEADQUARTERS, DEPARTMENT OF THE ARMY,
AND HEADQUARTERS, U.S. MARINE CORPS
WASHINGTON, D.C., 22 April 1988

Operator's, Organizational, Direct Support, and General Support Maintenance Manual

AIR CONDITIONER, HORIZONTAL, COMPACT, 18,000 BTU/HR COOLING

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F18H	230V, Single Phase, 50/60 Hertz	4120-00-411-3729
F18H-3	208V, 3 Phase, 50/60 Hertz	4120-01-076-1753
K1F-18H-4	208V, 3 Phase, 400 Hertz	4120-01-177-5990
F18H-3A	208V, 3 Phase, 50/60 Hertz	4120-01-122-0626
F18H-4A	208V, 3 Phase, 400 Hertz	4120-01-122-0627

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5-19 and 5-20	5-19 and 5-20

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General, United States Army
Chief of Staff

Official:

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Brigadier General, United States Army
The Adjutant General

J. P. JONES, JR.
Rear Admiral, CEC, US Navy
Commander
Naval Facilities Engineering Command

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Lieutenant General, USMC
Deputy Chief of Staff for Installations and Logistics

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DEPARTMENT OF THE ARMY AND MARINE CORPS
WASHINGTON, D.C., 21 February 1987

Operator's, Organizational, Direct Support, and General Support Maintenance Manual

AIR CONDITIONER, HORIZONTAL, COMPACT, 18,000 BTU/HR COOLING

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F18H-4A	208V, 3 Phase, 400 Hertz	4120-01-122-0627

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DEPARTMENT OF THE ARMY TECHNICAL MANUAL
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WASHINGTON, D.C., 25 September 1984

Operator's, Organizational, Direct Support And General Support Maintenance Manual

AIR CONDITIONER, HORIZONTAL, COMPACT, 18,000 BTU/HR COOLING

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F18H-3	208V, 3 Phase, 50/60 Hertz	4120-01-076-1753
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Major General, United States Army
The Adjutant General

H. A. HATCH
Lieutenant General, USMC
Deputy Chief of Staff for
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DISTRIBUTION:
Active Army:
To be distributed in accordance with DA Form 12-25C, Operator Maintenance requirements for Environmental Equipment Air Conditioners, 18,000 BTU, Compact.

MARINE CORPS:
MARCORPS CODE: AGC

WARNING

HIGH VOLTAGE is used in the operation of this equipment.

DEATH ON CONTACT or severe injury may result if personnel fail to observe safety precautions.

Always disconnect the air conditioner from power source before performing maintenance on this equipment.

Do not operate the air conditioner without louvers, top covers, and guards in place and tightly secured.

WARNING

Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, refer to FM 21-11.

WARNING

REFRIGERANT UNDER PRESSURE is used in the operation of this equipment.

DEATH or severe injury may result if personnel fail to observe safety precautions.

Never use a heating torch on any part that contains refrigerant-22.

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas.

WARNING

Never work on this equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment.

Take particular care to ground every capacitor likely to hold a dangerous potential.

When working inside the equipment, after the power has been turned off, always ground every part before touching.

WARNING

Be careful not to contact high-votage connections of 208 volt ac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

WARNING

The burning of polyurethane foams is dangerous. Due to the chemical composition of a polyurethane foam, toxic fumes are released when it is burned or heated.

If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area.

An exhaust system equivalent to that of a paint spray booth should be used.

Air supplied respirators, approved by the National Institute for Occupational Safety and Health or the U.S. Bureau of Mines, should be used for all welding in confined spaces and when ventilation is inadequate.

Individuals who have chronic or recurrent respiratory conditions, including allergies and asthma should not be employed in this type of environment.

WARNING

Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing.

Wear thermal protective gloves and a face protector or safety glasses in any situation where skin- or eye-contact is possible.

Prevent contact of refrigerant gas with flame or hot metal surfaces.

Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.

Dry cleaning solvent (Fed. Spec P-D-680) used to clean parts is potentially dangerous to personnel and property.

Do not use near open flame or excessive heat. Flash point of solvent is 100° F to 138° F (38° C to 59° C).

TM 5-4120-367-14
TM 07592B-14/1

TECHNICAL MANUAL

No. 5-4120-367-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 24 November 1980

OPERATOR'S, ORGANIZATIONAL DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL AIR CONDITIONER, HORIZONTAL, COMPACT, 18,000 BTU/HR COOLING

MODEL	POWER	NSN
F18H	230V, Single Phase, 50/60 Hertz	4120-00-411-3729
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F18H-3A	208V, 3 Phase, 50/60 Hertz	4120-01-122-0626
F18H-4A	208V, 3 Phase, 400 Hertz	4120-01-122-0627

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U. S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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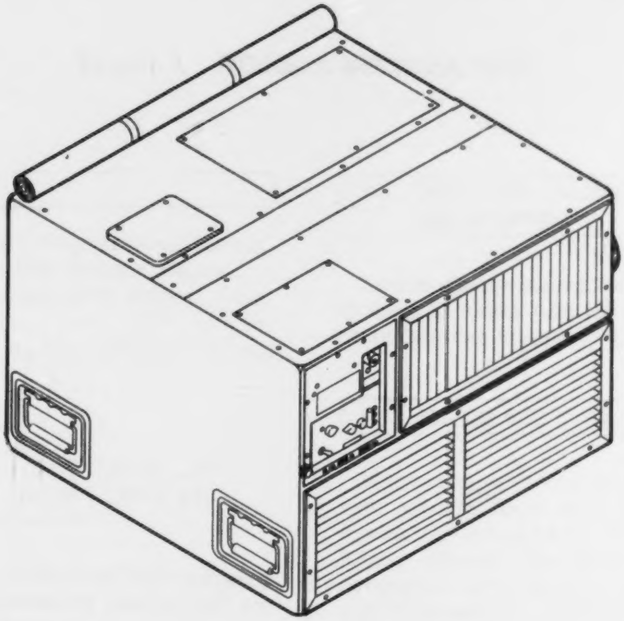

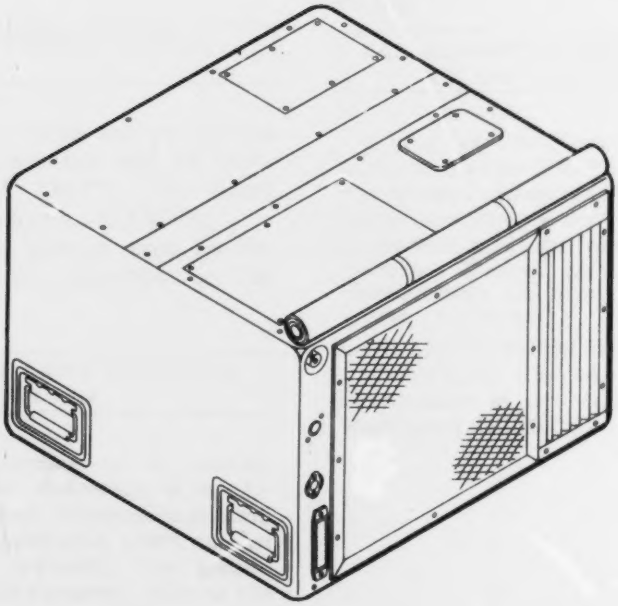

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Figure 1-1. Air Conditioner 3/4 Views

CHAPTER 1. INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

a. Type of Manual: Operator's, Organizational, Direct Support and General Support Maintenance Manual.

b. Model Numbers and Equipment Names: Keco Models F18H, F18H-3, and KIF-18H-4, F18H-3A and F18H-4A, 18,000 BTUH Cooling, Air Conditioners.

NOTE

Unless otherwise noted the F18H-3A and F18H-4A are identical to the F18H-3 and KIF-18H-4 respectively.

c. Purpose of Equipment. Cools and heats enclosed space (shelter). The units covered by this manual are designed for cooling and heating air to a desired predetermined range and circulating the conditioned air to provide heating and cooling of equipment or personnel within the air conditioned area.

1-2. MAINTENANCE FORMS, RECORDS AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

Maintenance forms and records used by the Marine Corps personnel are prescribed in TM 4700-15/1.

1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.

Command decisions, according to the tactical situation, will determine when destruction of the Air Conditioner will be accomplished. A destruction plan will be prepared by the using organization, unless one has been prepared by higher authority. For general destruction procedures for this equipment, refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command).

1-4. PREPARATION FOR STORAGE OR SHIPMENT.

Administrative storage of the Air Conditioner shall conform generally with the provisions of TM 740-90-1, Administrative Storage of Equipment.

1-5. HAND RECEIPT MANUAL

Hand receipts for the End Item/Components of End Item (COEI), Basic Issue Items (BII), and Additional Authorization List (AAL) items are published in a Hand Receipt Manual. The Hand Receipt Manual numerical designation is the same as the related Technical Manual with the letters HR added to the number. These manuals are published to aid in property accountability and are available through: Commander, US Army Adjutant General Publication Center, ATTN: AGDL-OD, 2800 Eastern Blvd., Baltimore, MD 21220.

Not applicable to the Marine Corps. Refer to SL-1-3.

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS)

If your Air Conditioner needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on a SF 368 (Quality Deficiency Report). Mail it to us at Commander, Headquarters, US Army Troop Support Command, ATTN: AMSTR-QX, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. We'll send you a reply.

Marine Corps - by NAVMC form 10772 directly to: Commandant of the Marine Corps, ATTN: LMA-1, Washington, DC 20380.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

a. Characteristics. The Keco Air Conditioner:
Cools air to a shelter
Heats air to a shelter
Ventilates or circulates air in a shelter

b. Capabilities and Features of Model F18H

Cooling Capacity on COOL, BTU/Hour	18,000
Heating Capacity on HIGH HEAT, BTU/Hour	14,300
Heating Capacity on LOW HEAT, BTU/Hour	7,500
Power Requirements:	
Voltage	230
Phases	Single
Frequency, Hertz	50/60
Amperes, phase (maximum)	
Cooling	23
Heating	40
Watts, running (maximum)	
Cooling	5200
Heating	4400
Refrigerant type	R-22
Amount of charge, pounds	5.5 lbs (2.5 kg)

c. Capabilities and Features of Model F18H-3:

Cooling Capacity on COOL, BTU/Hour	18,000
Heating Capacity on HIGH HEAT, BTU/Hour	14,300
Heating Capacity on LOW HEAT, BTU/Hour	7,500
Power Requirements:	
Voltage	208
Phases	3
Frequency, Hertz	50/60
Amperes, each phase (maximum)	
Cooling	16
Heating	15
Watts, running (maximum)	
Cooling	5000
Heating	4400
Refrigerant type	R-22
Amount of charge, pounds	5.5 lbs (2.5 kg)

d. Capabilities and Features of Model K1F-18H-4:

Cooling Capacity on COOL, BTU/Hour	18,000
Heating Capacity on HIGH HEAT, BTU/Hour	14,300
Heating Capacity on LOW HEAT, BTU/Hour	7,500
Power Requirements:	
Voltage	208
Phases	3
Frequency, Hertz	400
Amperes, each phase (maximum)	
Cooling	26.4
Heating	15
Watts, running (maximum)	
Cooling	6500
Heating	5200
Refrigerant type	R-22
Amount of charge, pounds	5.5 lbs (2.5 kg)

e. Operating Temperatures. The air conditioners are capable of functioning as follows:

(1) Start, operate, and cycle on cooling mode up to plus 120° F (49° C) ambient temperature with air up to plus 120° F (49° C) entering the evaporator and condenser.

(2) Operate on cooling mode without forming frost or ice on the evaporator at 55° F (12° C) ambient temperature with air at plus 67° F (19° C) dry bulb and plus 57° F (14° C) wet bulb entering the evaporator.

(3) Operate on the heating mode in ambient temperatures as low as minus 50° F (10° C) and as high as plus 80° F (26° C).

(4) Start and operate on cooling mode at 0° F (-18° C) ambient temperature with air at plus 70° F (21° C) entering the evaporator.

f. Evaporator Airflow. With MODE SELECTOR set at VENT and the FAN SPEED set at HIGH, the evaporator airflow will be as follows:

Model	SCFM	m^3/m
F18H	590	16.5
F18H-3	590	16.5
F18H-4	640	17.9

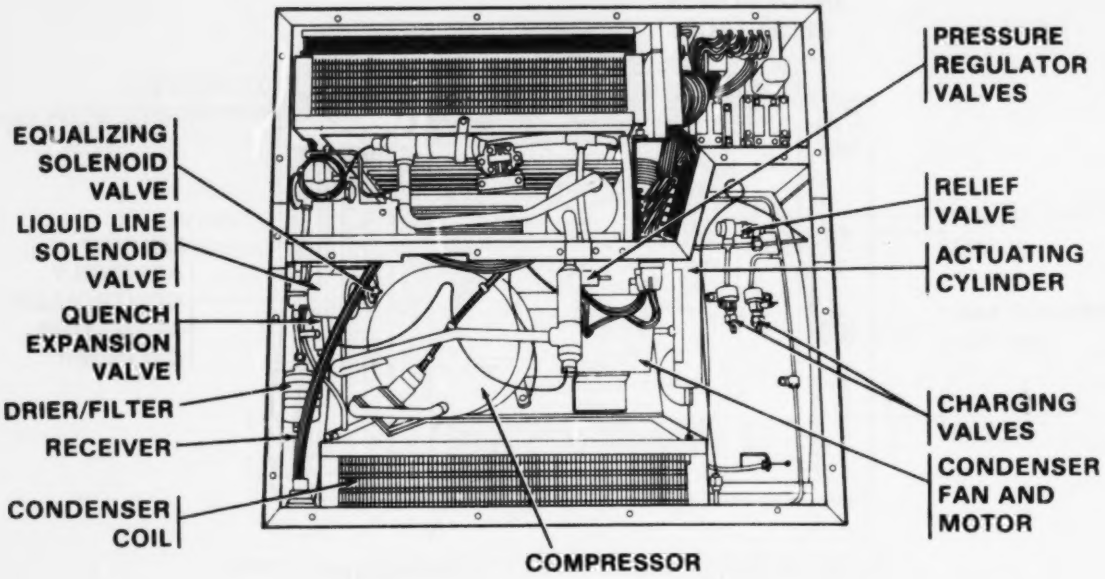


Figure 1-2. Air Conditioner, Condenser Section (Sheet 1 of 2)

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

a. Condenser Section (See figure 1-2)

Equalizing Solenoid Valve: This solenoid valve causes discharge and suction pressures to equalize whenever compressor is not operating.

Liquid Line Solenoid Valve: This solenoid valve controls flow of liquid refrigerant to the evaporator coil.

Quench Expansion Valve: This valve controls expansion of liquid refrigerant to gas in the suction line when the suction line super heat rises above 31 to 33° F (-1 to +1° C).

Drier/Filter (Dehydrator): A Drier/Filter (dehydrator) is a device used to remove water or water vapor from the refrigerant.

Receiver: The receiver is a storage tank for liquid refrigerant.

Condenser Coil: It is constructed of inter-connected parallel tubes which are retained in a series of multiple, closely spaced fins. Hot compressed gas is air cooled to a liquid in this coil.

Compressor: It consists of a reciprocating compressor driven by an electric motor, hermetically sealed into a steel container with a lifetime charge of oil. A crankcase heater surrounds the lower part of the container. The heater is thermostatically controlled to prevent migration of liquid refrigerant into the crankcase where it would become mixed with the oil.

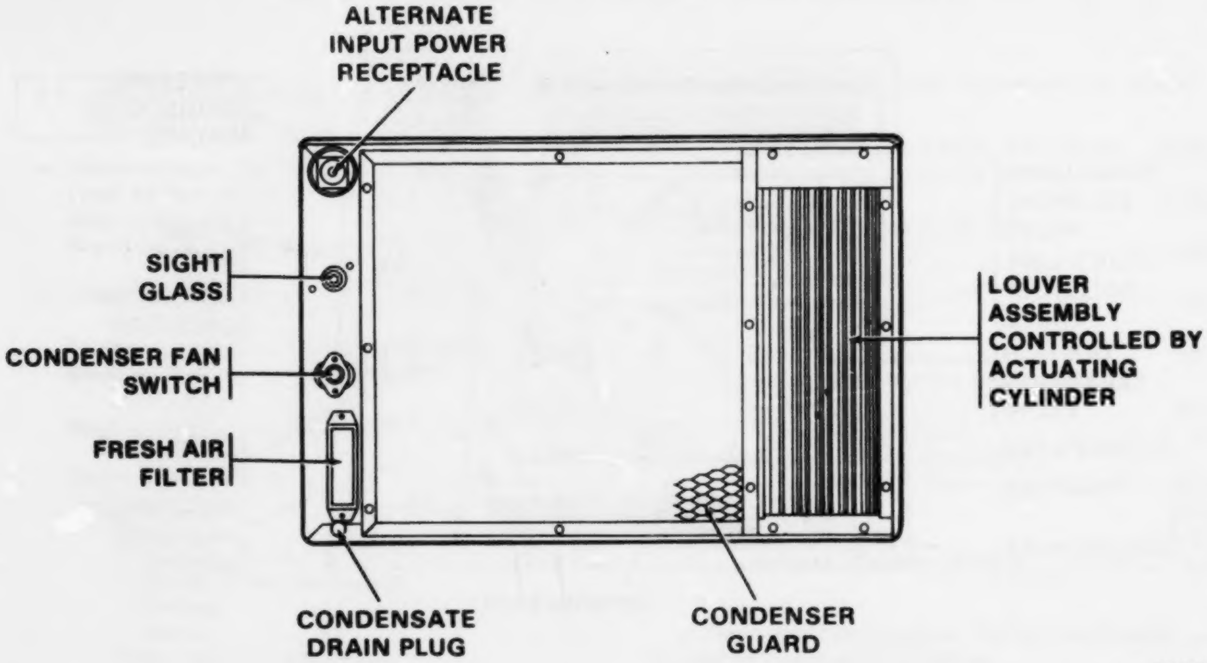
Pressure Regulator Valves: The pressure regulator valves are part of the hot gas by-pass circuit and open when the compressor suction pressure drops below a preset level of *68 psig* (4.78 kg/cm^2).

Relief Valve: The relief valve opens when the discharge line pressure rises above 540 psig (37.97 kg/cm^2).

Actuating Cylinder: This hydraulic cylinder operates discharge louver assembly. It will start to open the louver assembly at 150 to 180 psig (10.55 to 12.66 kg/cm^2) and fully open louver assembly at 220 to 260 psig (15.74 to 18.28 kg/cm^2) compressor discharge pressure to allow unit operation when outside temperature is low.

Charging Valve: The charging valves provide connection ports so that refrigerant can be put into the system. They also provide ports for checking system operating pressures.

Condenser Fan and Motor: This fan and motor draws outside air over and thru the condenser coil in order to remove the heat from the hot gas entering the condenser coil.


ALTERNATE INPUT POWER RECEPTACLE
SIGHT GLASS
CONDENSER FAN SWITCH
FRESH AIR FILTER
LOUVER ASSEMBLY CONTROLLED BY ACTUATING CYLINDER
CONDENSATE DRAIN PLUG
CONDENSER GUARD

A01282
TM5-4120-367-14-30

Figure 1-2. Air Conditioner, Condenser Section (Sheet 2 of 2)

Input Power Receptacle (Alternate location): Connection for power supply.

Sight Glass, Liquid Indicator: The condition of liquid refrigerant flowing through the system can be observed through this window when the compressor is operating in the cooling mode. A milky or bubbly appearance of the refrigerant indicates that the system contains insufficient refrigerant, and that more must be added. The center of the sight glass has an area which indicates moisture content of the refrigerant. This area will change colors; green, chartreuse, and yellow.

COLOR	MOISTURE CONTENT
Green	None
Chartreuse	Slight
Yellow	Replace Drier/Filter and Refrigerant

Condensate Drain Plug: Drain connection for water collected below evaporator coil.

Condenser Fan Switch: Controls fan speed. At temperatures above 100° F (38° C) closes to allow high speed; below 100° F (38° C) opens to allow only low speed operation.

Fresh Air Filter: This filter cleans outside air drawn into the shelter.

NOTE:

> The air conditioner can be equipped for operation in chemical-biological-radiological (CBR) environment by connecting filtering equipment to the fresh air filter.

Louver Assembly: Automatically controlled by actuating cylinder.

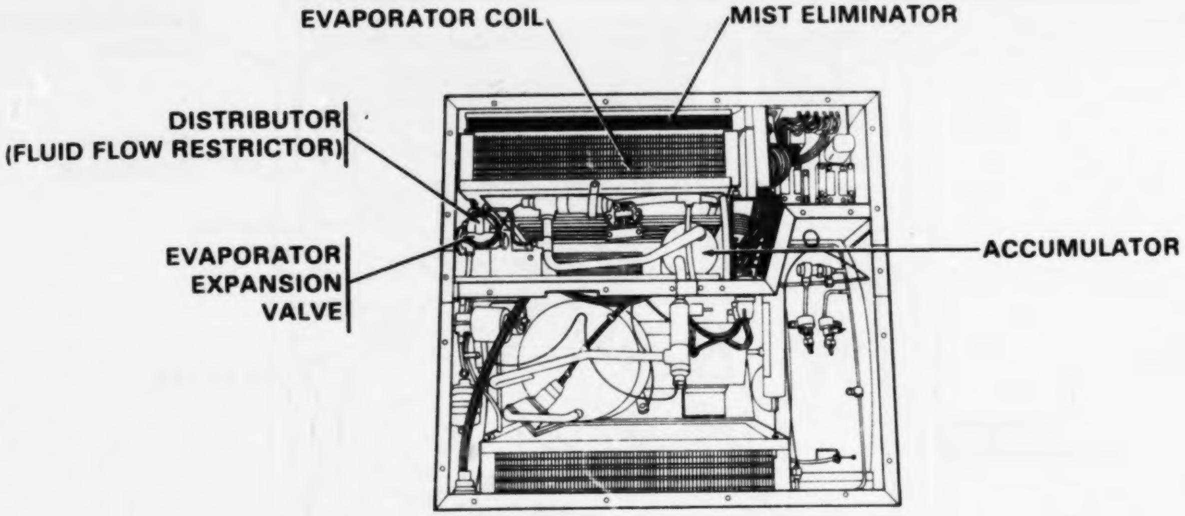

EVAPORATOR COIL
MIST ELIMINATOR
DISTRIBUTOR (FLUID FLOW RESTRICTOR)
EVAPORATOR EXPANSION VALVE
ACCUMULATOR

Figure 1-3. Air Conditioner, Evaporator Section (Sheet 1 of 2)

b. Evaporator Section (See figure 1-3).

Evaporator Expansion Valve: This valve controls the amount of liquid refrigerant to the evaporator.

Distributor: This distributor divides expanding refrigerant to three circuits of the evaporator coil.

Evaporator Coil: The evaporator coil converts the liquid refrigerant into gas to cool the air.

Mist Eliminator: The purpose of the mist eliminator is to trap droplets of condensed water which has formed on the evaporator coil, so that they will not be blown into the air conditioned space.

Accumulator: The accumulator is a tank that holds the liquid refrigerant which might be mixed with the gas leaving the evaporator coil preventing liquid refrigerant from entering the compressor.

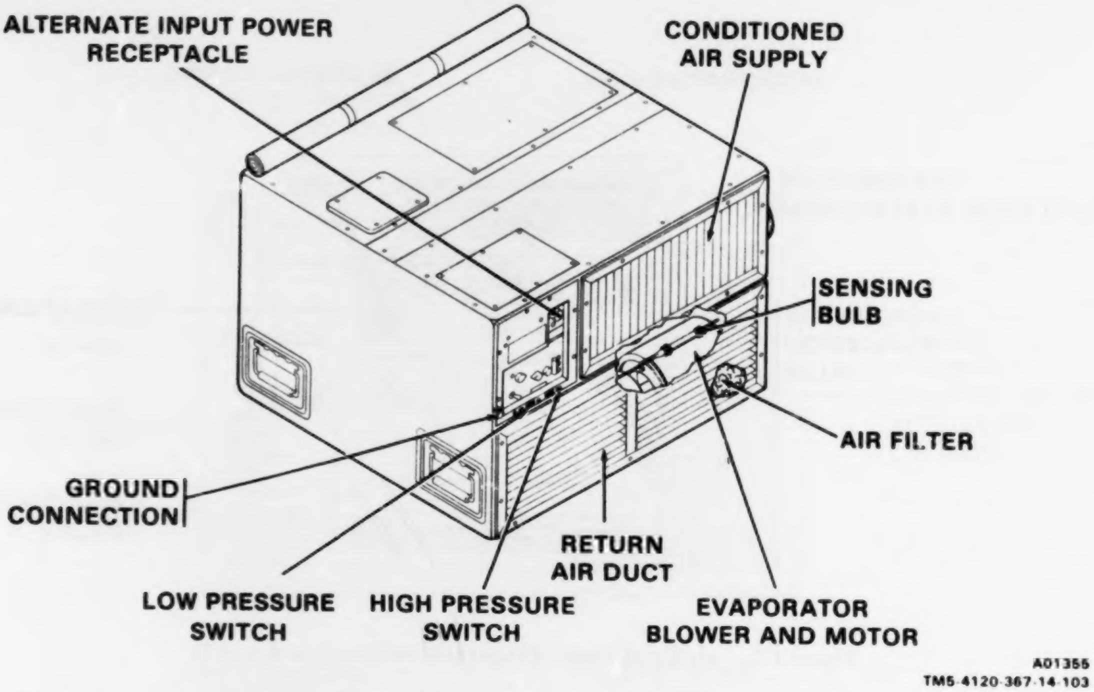

ALTERNATE INPUT POWER RECEPTACLE
CONDITIONED AIR SUPPLY
SENSING BULB
AIR FILTER
GROUND CONNECTION
RETURN AIR DUCT
LOW PRESSURE SWITCH
HIGH PRESSURE SWITCH
EVAPORATOR BLOWER AND MOTOR
A01355
TM5-4120-367-14-103

Figure 1-3. Air Conditioner, Evaporator Section (Sheet 2 of 2)

Input Power Receptacle (Alternate Location): Connection for power supply.

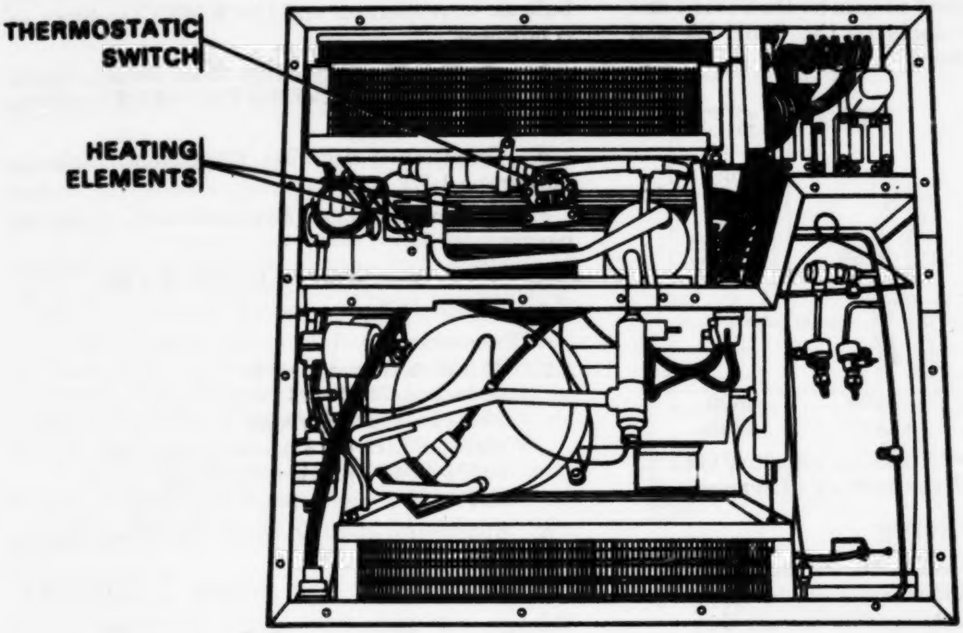
Ground Connection: The ground connection is an external point where shelter or van electrical ground is connected to the air conditioner.

Low Pressure Switch: This switch opens when suction line pressure drops to 10 to 20 psig (.703 to 1.406 kg/cm²); this switch must be hand reset after the line pressure rises above 40 psig (2.812 kg/cm²).

High Pressure Switch: The high pressure switch opens when the discharge line pressure rises to 435 to 455 psig (30.58 to 31.99 kg/cm²) to stop the compressor; this switch must be hand reset after the line pressure drops to 320 psig (22.50 kg/cm²).

Evaporator Blower and Motor: The evaporator blower and motor blows the shelter air over the evaporator coil to give up heat to the refrigerant (cool mode) or draws in the fresh or shelter air for ventilation.

Air Filter: The air filter removes dirt and dust from the air that is to be conditioned (not illustrated, located behind air intake grill).



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TM5-4120-367-14-31

Figure 1-4. Air Conditioner, Top View, Top Covers Removed, Heating Section.

c. Heating Section (See figure 1-4).

Heating Elements: The heating elements heat the air before it passes through the evaporator coil.

Thermostatic Switch (Overheat Safety): The thermostatic switch opens the heating circuit at 145° F to 150° F (63° C to 66° C) and closes at 100° F to 120° F (38° C to 49° C).

1-9. DIFFERENCES BETWEEN MODELS

Unless otherwise specified all data for the F18H-3 and KIF-18H-4 will also apply to the F18H-3A and KIF-18H-4A respectively.

	F18H	F18H-3	KIF-18H-4
Power Supply			
Voltage	230	208	208
Phases	Single	3	3
Frequency, Hertz	50/60	50/60	400
*Amperes			
Cooling	23	16	26.4
Heating	20	12	15
*Watts			
Cooling	5200	5000	6500
Heating	4400	4400	5200

*Conditions: 120 °F (49 °C) ambient with 90 °F (32.2 °C) dry bulb 75 °F (23.9 °C) wet bulb air to evaporator.

NOTE

The compressor, condenser fan motor and the evaporator blower motor are different. They are not interchangeable because they have different windings for the different required power supplies.

NOTE

The information contained in this manual is applicable to all models except for differences noted. Differences in procedure will be detailed at point where they occur.

1-10. EQUIPMENT DATA

a. Types of Conditioning Available

High Vent Mode...Maximum air ventilation and filtering

Low Vent Mode...Low velocity air ventilation and filtering

High Cool Mode...Maximum cooling, filtering, and dehumidification

Low Cool Mode...Low velocity cooling, filtering and dehumidification

High Heat Mode...High velocity heating

Low Heat Mode...Low velocity heating

b. Cooling Capacity (High Cool Mode)...18,000 BTU/Hr at 90 °F (32.2 °C) dry bulb 75 °F (23.9 °C) wet bulb air to evaporator and 120 °F (49 °C) ambient air conditions

c. Heating Capacity (High Heat Mode)...14,300 BTU/Hr in an ambient of -50 °F to +80 °F (-45.5° to 29.4 °C)

d. Conditioned Air Flow (Maximum)...Refer to paragraph 1-7.

e. Electrical Power Requirements...Refer to paragraph 1-7.

f. Refrigerant (R22)...5.5 pounds (2.5 kg)

g. Physical Characteristics

Dimensions...
30 inches (76.2 cm) wide
28 inches (71.12 cm) deep
20 inches (50.8 cm) high
Weight...F18H—278 pounds (126.1 kg)
F18H-3—270 pounds (122.5 kg)
KIF-18H-4—265 pounds (120.2 kg)

h. Evaporator and Condenser Fan Motor Rating

	F18H	F18H-3	KIF-18H-4
Voltage	230	208	208
Hertz	50/60	50/60	400
Phase	1	3	3
RPM			
High	3450	3450	3750
Low	1725	1725	1800
Amperes			
High	3.5	2.3	6.0
Low	1.2	0.9	3.0
HP			
High	.73	.73	1.1
Low	.12	.12	.27
Duty	Continuous	Continuous	Continuous
Thermal Protector	248 °F (120 °C)	248 °F (120 °C)	302 °F (150 °C)
Rotation (Facing Shaft End)	Counter-Clockwise	Counter-Clockwise	Counter-Clockwise

i. Compressor Motor Rating

	F18H	F18H-3	KIF-18H-4
Voltage	230	208	208
Hertz	50/60	50/60	400
Phase	Single	3	3
Thermal Protector	Internal	Internal	Internal

j. Switch Setting...

Low Pressure Cutout...Open at 10 to 20 psig (.703 to 1.406 kg/cm^2). Hand reset when pressure rises to 40 psig (2.812 kg/cm^2).

High Pressure Cutout...Open at 435 to 455 psig (30.58 to 31.99 kg/cm^2). Hand reset when pressure decreases to 320 psig (22.50 kg/cm^2).

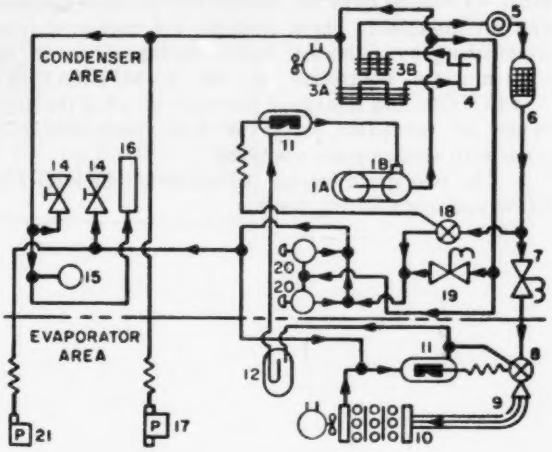
Section III. PRINCIPLES OF OPERATION

1-11. REFRIGERATION CYCLE.

a. The Refrigerant Cycle. The refrigeration system removes heat from a given area. See Figure 1-5 for a schematic of the refrigeration cycle.

- The compressor (1) takes cold,low pressure refrigerant gas and compresses it to a high temperature, high pressure gas. This gas flows through the metal tubing to the split condenser coil (3) and receiver (4).
- The condenser fan draws outside ambient air over and through the two section condenser coil (3). The high temperature, high pressure gas from the compressor (1) is cooled by the flow of air and is changed into a high pressure liquid.
- The liquid sight glass (5) indicates the presence of moisture and quantity of refrigerant in the system.
- The drier/filter dehydrator (6) removes any moisture (water vapor) or dirt that may be carried by the liquid refrigerant.
- The solenoid valve (7) is controlled by the temperature selector on the control panel. This valve will shut off the flow of refrigerant to the evaporator section when the temperature in the conditioned area reaches the set point.
- The expansion valve (8) controls the amount and pressure of liquid refrigerant to the evaporator coil (10). The expansion valve (8) senses the temperature and pressure of the refrigerant as it leaves the evaporator coil. By use of the feeler bulb in the bulb well (11) and "external equalizer line" the valve constantly adjusts the flow of liquid refrigerant to the evaporator coil (10).
- As the high pressure liquid refrigerant leaves the expansion valve (8) it enters the evaporator coil (10). As the liquid enters the coil, due to the size difference between the coil and the tubing, the pressure is suddenly decreased. As the pressure decreases the liquid refrigerant "flashes" to a gas. The evaporator blower circulates the warm air from the conditioned space over and through the evaporator coil. Liquid absorbs heat when it changes from a liquid to a gas. As the air from the conditioned spaces comes in contact with evaporator coil (10), the air is cooled.
- The accumulator (12) holds any liquid refrigerant which did not change to a gas in the evaporator. Heat in the evaporator section will boil this liquid to a gas before entering the compressor.
- To prevent compressor damage during start-up, solenoid valve (19) is normally open to equalize pressure on both sides of the compressor.

b. Bypass System. This unit has a bypass system which allows cooling operation at low cooling loads without cycling the compressor on and off. In bypass the refrigerant is piped from the discharge to the suction side of the compressor, bypassing the evaporator coil (10).



FIND NO.	NOMENCLATURE
1A	COMPRESSOR
1B	SUCTION LINE FILTER
3A	COIL, CONDENSER WITH ANGLE
3B	SUBCOOLER
4	RECEIVER, LIQUID REFRIGERANT
5	INDICATOR, SIGHT, LIQUID
6	DEHYDRATOR, DESICCANT, REFRIGERANT
7	SOLENOID VALVE, WITH LEADS
8	VALVE, EXPANSION (PRIMARY)
9	RESTRICTOR, FLUID FLOW
10	COIL, EVAPORATOR WITH ANGLE
11	BULB WELL
12	ACCUMULATOR
14	VALVE, CHARGING, WITH CAP
15	VALVE, PRESSURE RELIEF
16	CYLINDER ASSY, ACTUATING, LINEAR
17	SWITCH, PRESSURE (HIGH)
18	VALVE, EXPANSION (QUENCH)
19	SOLENOID VALVE WITH LEADS
20	REGULATOR, FLUID PRESSURE
21	SWITCH, PRESSURE (LOW)

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Figure 1-5. Refrigerant Flow Diagram

- When the temperature selector on the control panel senses that cooling conditions have reached the set point, it closes the solenoid valve (7) to shut off refrigerant flow to the evaporator coil (10).
- As the compressor suction pressure starts to drop, the pressure regulators (20) open to allow flow of hot gas from the compressor.
- The quench valve (18) senses the temperature of the gas at the suction side of the compressor. To prevent excessively hot gas from reaching the compressor the quench valve (18) opens to allow liquid refrigerant to mix with the hot gas.

1-12. HEATING.

a. When the MODE SELECTOR is set for HIGH Heat, six heating elements, located behind the evaporator coil are energized. These elements are protected from overheating by a thermal cutout switch. Three of the elements are controlled by the TEMPERATURE SELECTOR, and remaining three are on all of the time. When set for LOW, only the three thermostatically controlled elements are energized.

b. The two speed fan can be set for either HIGH or LOW operation during heating.

1-13. LIST OF ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
C	Centigrade
CBR	Chemical-Biological-Radiological
cm^2	Centimeter Squared
DC	Direct Current
F	Fahrenheit
HP	Horse Power
HPCO	High Pressure Cut-Out
kg	Kilogram
lbs	Pounds
LPCO	Low Pressure Cut-Out
psi	Pounds Square Inch
psig	Pounds Square Inch Gauge
RPM	Revolutions Per Minute
rqr	Required
VDC	Volts Direct Current

CHAPTER 2. OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATORS CONTROLS AND INDICATORS

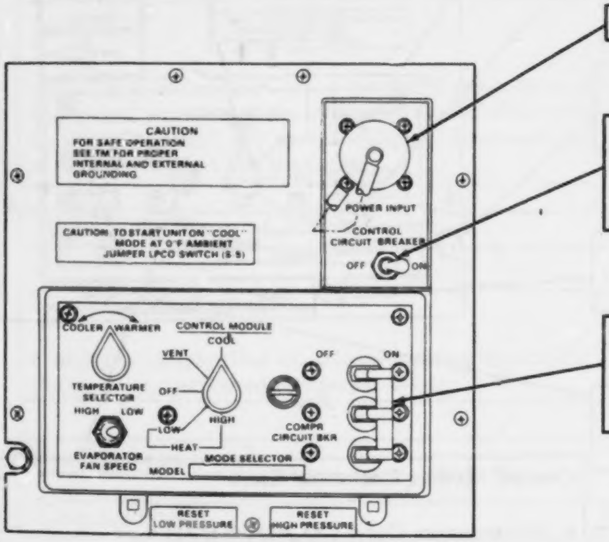
CAUTION

Before turning on any of the air conditioner's operating controls, make sure that the fabric cover is rolled up and secured, and that evaporator intake and discharge grilles are fully open.

2-1. CONTROLS AND INDICATORS

CAUTION

To start unit on "cool" mode at 0° F ambient jumper LPCO switch (S-5).


CAUTION
FOR SAFE OPERATION
SEE TM FOR PROPER
INTERNAL AND EXTERNAL
GROUNDING
CAUTION TO START UNIT ON "COOL" MODE AT 0°F AMBIENT JUMPER LPCO SWITCH (S 5)
POWER INPUT
CONTROL CIRCUIT BREAKER
OFF
ON
COOLER
WARMER
CONTROL MODULE
COOL
VENT
OFF
LOW
HIGH
HEAT
TEMPERATURE SELECTOR
HIGH
LOW
EVAPORATOR FAN SPEED
MODE SELECTOR
MODEL
OFF
ON
COMPR CIRCUIT BKR
RESET LOW PRESSURE
RESET HIGH PRESSURE

Power input connector, alternate location

Control Circuit Breaker

- Move switch to ON position to reset
- Move switch to OFF for power off

Compressor Circuit Breaker

- Move switch to ON position to reset
- Move switch to OFF position for power off

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2-1. CONTROLS AND INDICATORS CONTINUED

CAUTION

For safe operation see Chapter 3 for proper internal and external grounding.

Mode Selector Switch

- Turn switch to cool for cooling
- Turn switch to vent for vent
- Turn switch to low heat or high heat for heating
- Turn switch to OFF to shut unit down

Temperature Selector Switch

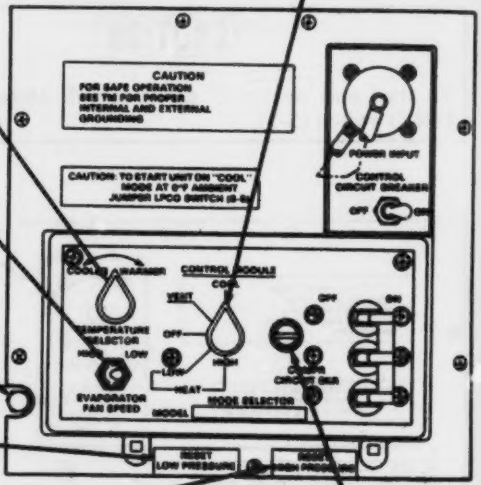
- Turn knob to adjust level of cooling or heating
  - * Clockwise for warmer Approx. 90° F (32.2° C)
  - * Counterclockwise for cooler Approx. 60° F (15.5° C)

Evaporator Fan Speed

- Turn switch to low for low speed
- Turn switch to high for high speed

External Ground Connection

- Connect to shelter or van internal ground


CAUTION
FOR SAFE OPERATION
SEE TM FOR PROPER
INTERNAL AND EXTERNAL
GROUNDING
CAUTION: TO START UNIT ON "COOL"
MODE AT 0°F AMBIENT
JUMPER LPCO SWITCH
POWER INPUT
CONTROL
CIRCUIT BREAKER
OFF
ON
COOLER
WARMER
CONTROL MODULE
COOL
VENT
OFF
LOW
HIGH
HEAT
TEMPERATURE
SELECTOR
HIGH
LOW
EVAPORATOR
FAN SPEED
MODEL
MODE SELECTOR
OFF
ON
COMPR.
CIRCUIT BKR
RESET
LOW PRESSURE
RESET
HIGH PRESSURE

Low Pressure Cutout Switch

- Push to reset

High Pressure Cutout Switch

- Push to reset

Control Module Connector Knob *

- (Maintenance Only) DO NOT TURN

NOTE

The control range of the TEMPERATURE SELECTOR switch is 60 to 90° F (15.5 to 32.2° C).

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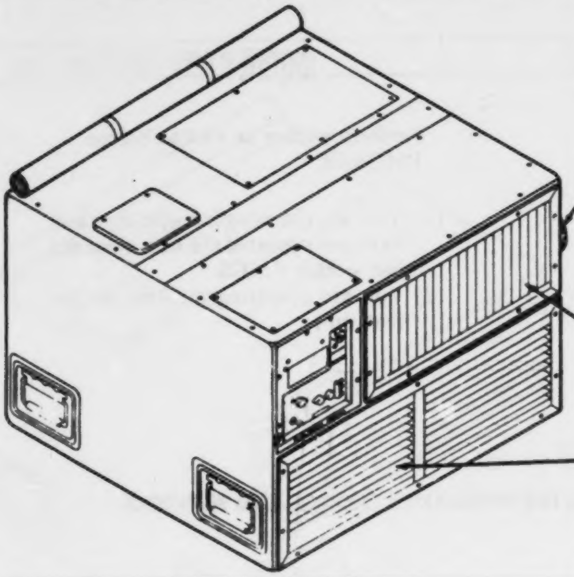
TM5-4120-367-14-06

* The connector knob was supplied on units prior to 1983. This knob is not supplied on F18H-3A or F18H-4A units and is not required on existing F18H, F18H-3 or F18H-4 units. Use screw driver slot in end of shaft.

2-1. CONTROLS AND INDICATORS CONTINUED



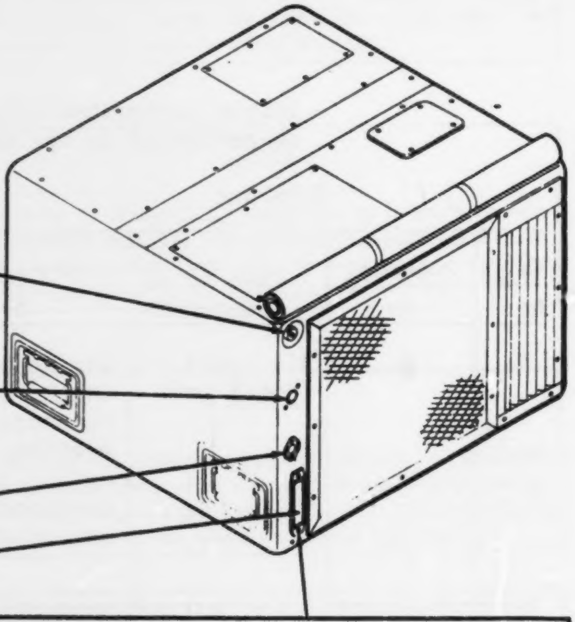
Fresh Air Inlet Vent Control
- Rotate downward to open vent
- Rotate Upward to close vent

Air Outlet Louvers
- Individually moveable

Inlet Louver Tabs
- Move TABS upward to open louvers
- Move TABS downward to close louvers

NOTE

Cool air is denser than warm air, so it tends to sink downward; therefore, it is usually desirable to direct cool air slightly upward and warm air slightly downward for maximum comfort and coverage.



Power Input Connector, Main Location

Liquid Sight Indicator
- Milky or cloudy fluid or bubbles indicate insufficient charge or contaminated refrigerant system

Condenser Fan Switch

Fresh Air Inlet

Condensate Drain

NOTE

The air conditioner can be equipped for operation in chemical-biological-radiological (CBR) environment by connecting filtering equipment to the rectangular covered opening at the lower left side of the rear surface of the unit.

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TM5-4120-367-14-97

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-2. OPERATOR MAINTENANCE

The operator is required to perform preventive maintenance checks and services. Refer to Chapter 3, Table 3-5. Maintenance by operator/crew is limited to operating the air conditioner in COOL, LOW HEAT, HIGH HEAT, and VENT modes. Refer any malfunction to organizational maintenance.

NOTE

Perform weekly as well as before PMCSs if:

(1) You are the assigned operator and have not operated the item since the last weekly PMCS.

(2) You are operating the item for the first time.

Table 2-1. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

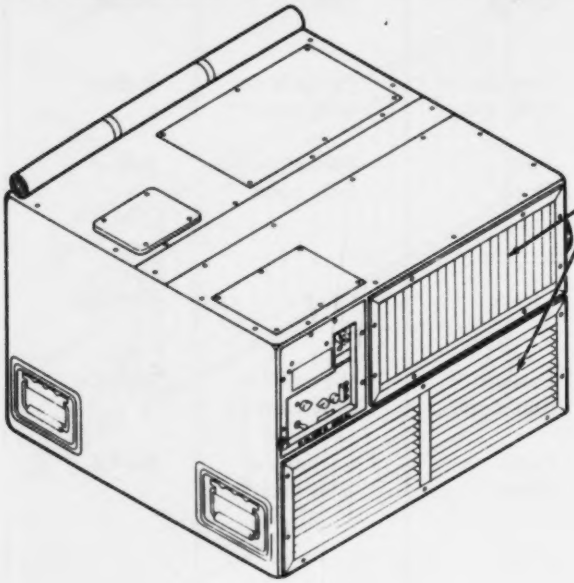
Within designated interval, these checks are to be performed in the order listed.

B-Before D-During

Item No.	Interval	Item to be Inspected	Procedures Check for and have repaired or adjusted as necessary	Equipment is Not Ready/ Available if:
	D			
1	●	Air Conditioner Unit	During starting and operation, check for unusual noise and rough running. Check for excessive vibration, lack of power, or any indication of a failing or defective component. If suspected, notify organizational maintenance.	

Section III. OPERATION UNDER USUAL CONDITIONS

2-3. BEFORE OPERATION



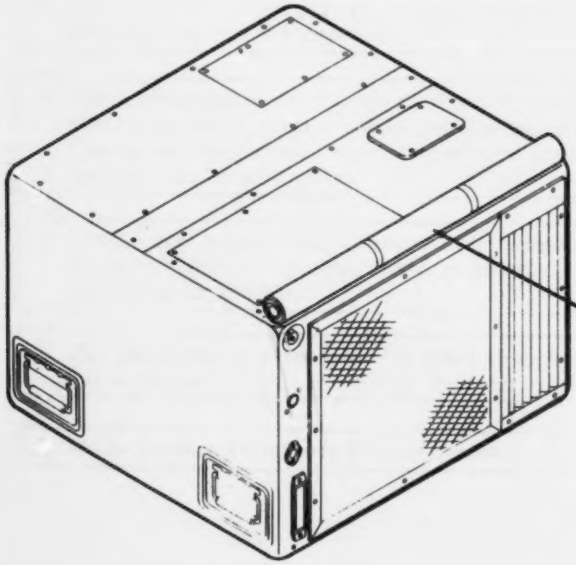
1. Check all air intake and discharge openings. They should be clear.

NOTE

When possible...the shelter circuit breaker (provides power to air conditioner) should be ON at least 6 hours before operating the unit in the cool mode. This allows the crankcase heater to raise the compressor oil temperature to normal operating range.

NOTE

Cool air is denser than warm air, so it tends to sink downward; therefore, it is usually desirable to direct cool air slightly upward and warm air slightly downward for maximum comfort and coverage.



NOTE

Under all but extreme weather conditions, it is desirable to introduce about 10 percent of fresh air into the system. This will create a slight positive pressure, and will help to eliminate the musty odors associated with stale air.

2. Condenser cover must be rolled up and tied on top of air conditioner.

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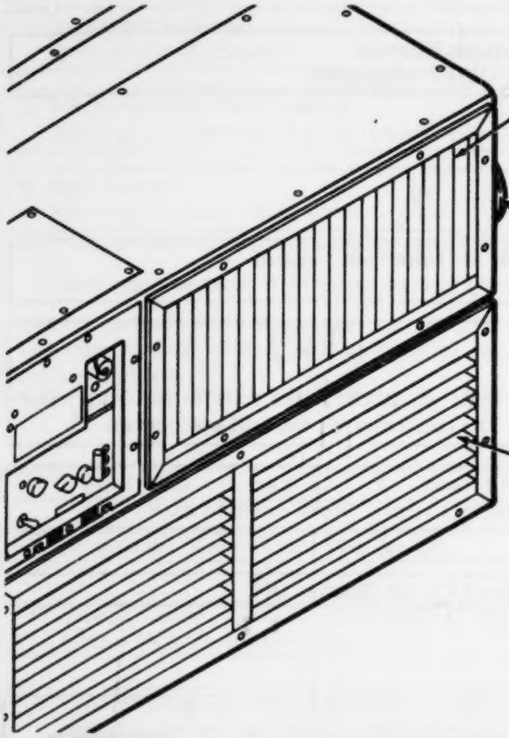
TM5-4120-367-14-98

Table 2-2. OPERATING SETTINGS

Mode	Mode Selector	Temperature Selector	Fresh Air Damper	Evaporator Intake Grille	*Fabric Cover
Cooling-100% Recirculated Air	COOL	Desired Temperature	Closed	Open	Rolled
Cooling-with fresh makeup air	COOL	Desired Temperature	Partially or fully open	Partially or fully closed*	Rolled
Cooling-with fresh makeup air through CBR filter	COOL	Desired Temperature	Fully Open	Partially or fully open*	Rolled
Heating-100% Recirculated Air	LO HEAT or HI HEAT	Desired Temperature	Closed	Open	Optional
Heating-with fresh makeup air	LO HEAT or HI HEAT	Desired Temperature	Partially or fully open	Partially or fully closed*	Rolled
Heating-with fresh makeup air through CBR filter	LO HEAT or HI HEAT	Desired Temperature	Fully Open	Partially or fully open*	Rolled
Ventilation-Maximum outdoor air	VENTILATE	Any Setting	Open	Closed	Rolled

*Partial closing of the evaporator intake grille causes a greater portion of the total airflow to be drawn from the outside.

2-4. COOLING OPERATION

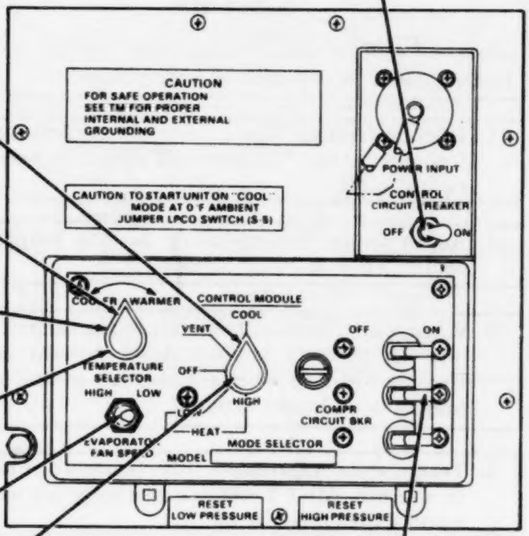


1. Air Outlet Louvers
Individually Adjustable

2. Fresh Air Inlet Vent Control
Turn up to close vent. Turn down to open vent

3. Inlet Louver
Move up to open. Move down to close

4. Control Circuit Breaker ON


CAUTION
FOR SAFE OPERATION
SEE TM FOR PROPER
INTERNAL AND EXTERNAL
GROUNDING
CAUTION TO START UNIT ON "COOL" MODE AT 0 F AMBIENT JUMPER LPCO SWITCH (S-5)
POWER INPUT
CONTROL CIRCUIT BREAKER
OFF
ON
COOLER
WARMER
CONTROL MODULE
COOL
VENT
OFF
TEMPERATURE SELECTOR
HIGH
LOW
EVAPORATOR FAN SPEED
LOW
HIGH
HEAT
MODE SELECTOR
MODEL
OFF
ON
COMPR CIRCUIT BKR
RESET LOW PRESSURE
RESET HIGH PRESSURE

11. Stop cooling. Turn mode selector to **OFF**

10. Adjust shelter temperature by turning temperature control knob in either direction.

9. When shelter temperature drops to the desired level, turn temperature control slowly toward warmer. Cooling will stop when temperature control senses cooling is no longer required.

8. **Temperature Adjustment.** Turn temperature selector to cooler. Within 2 minutes, discharge air will feel cooler than ambient air.

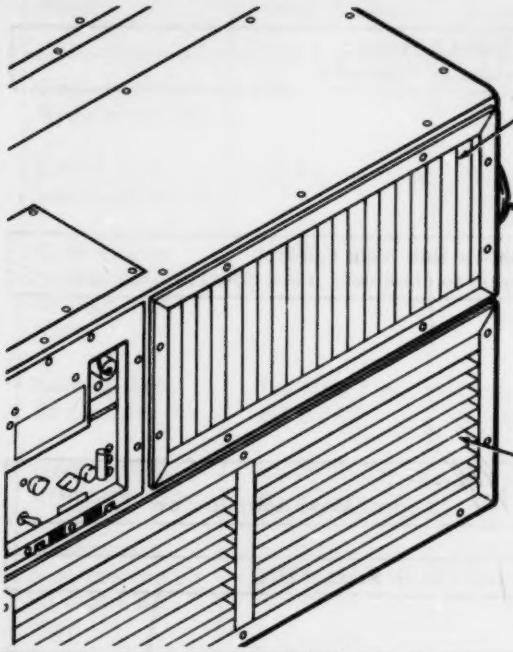
7. **Fan Speed.** Move evaporator fan speed to high or low as desired. After 5 seconds air flow can be felt.

6. **Mode Selector.** Turn Mode Selector Switch To Cool

5. Compressor Main Circuit Breaker ON

A01351
TM5-4120-367-14-99

2-5. LOW HEAT OPERATION



1. **Air Outlet Louvers**
Individually Adjustable

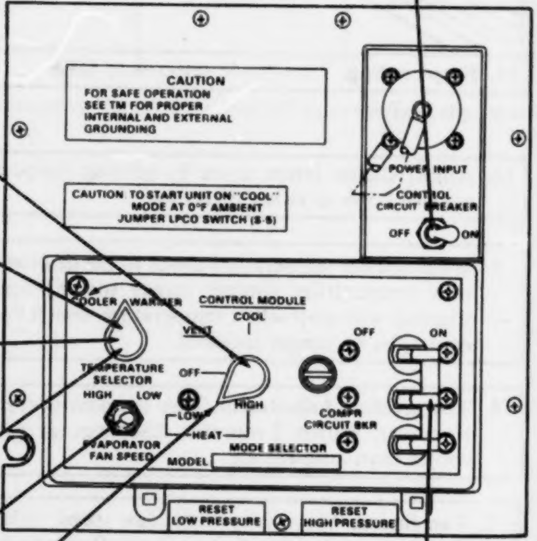
2. **Fresh Air Inlet Vent Control**
Turn up to close vent. Turn down to open vent

NOTE

In **low heat**, air is circulated only in the evaporator section. The condenser blower will **not** operate.

3. **Inlet Louver**
Move up to open. Move down to close

4. **Control Circuit Breaker ON.**



CAUTION
FOR SAFE OPERATION
SEE TM FOR PROPER
INTERNAL AND EXTERNAL
GROUNDING
CAUTION: TO START UNIT ON "COOL" MODE AT 0°F AMBIENT JUMPER LPCO SWITCH (S-5)
POWER INPUT
CONTROL CIRCUIT BREAKER
OFF
ON
COOLER
WARMER
CONTROL MODULE
COOL
VENT
OFF
TEMPERATURE SELECTOR
HIGH
LOW
LOW
HIGH
HEAT
EVAPORATOR FAN SPEED
MODEL
MODE SELECTOR
OFF
ON
COMPR CIRCUIT BKR
RESET LOW PRESSURE
RESET HIGH PRESSURE

5. **Compressor Main Circuit Breaker ON.**

6. **Mode Selector.** Turn selector switch to low heat. After 5 seconds, air flow can be felt.

7. **Fan Speed.** Move evaporator fan speed switch to high or low.

8. **Temperature Adjustment.** Turn temperature control to warmer. After 2 minutes, discharge air will feel warmer than ambient air.

9. When shelter temperature rises to the desired level, turn temperature control slowly toward **cooler.** Heating will stop when temperature control senses heating is no longer required.

10. Adjust shelter temperature by turning temperature control knob in either direction.

CAUTION

Move to vent to remove heat from electric heaters. Heaters could be damaged by heat buildup.

11. **To Stop Heating.** Move mode selector to vent for 5 minutes. After 5 minute vent operation, move switch to off.

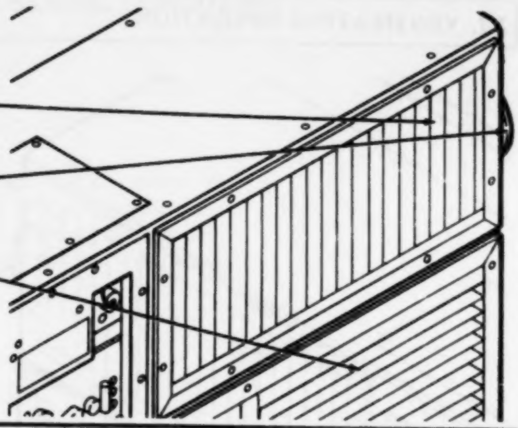
A01382
TM5-4120-367-14-100

2-6. HIGH HEAT OPERATION

1. **Air Outlet Louvers**
   Individually Adjustable

2. **Fresh Air Inlet Vent Control**
   Turn up to close vent. Turn down to open vent

3. **Inlet Louver**
   Move up to open. Move down to close



Note

The temperature control operates one bank of heating elements. In **high heat**, a second bank of elements is continuously **on.**

Note

In **high heat**, air is circulated only in the evaporator section. The condenser blower will not operate.

4. **Control Circuit Breaker ON.**

5. **Compressor Main Circuit Breaker ON.**

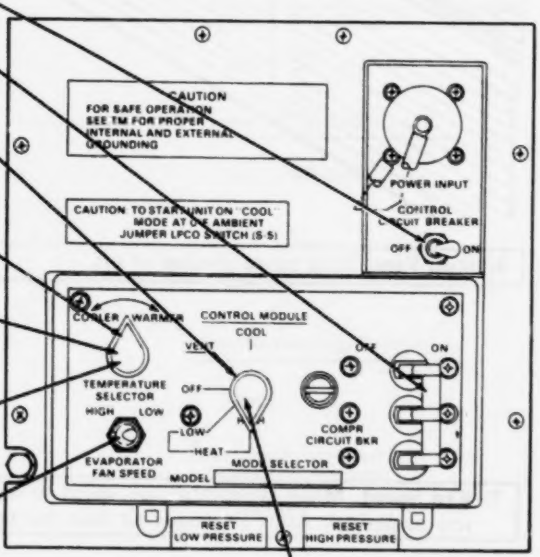
6. **Mode Selector.** Turn selector switch to high heat. After 5 seconds, air flow can be felt.

7. Turn temperature control to warmer. After 2 minutes, discharge air will feel warmer than ambient air.

8. When shelter temperature rises to the desired level, turn temperature control slowly toward **cooler.** Heating will stop when temperature control senses heating is no longer required.

9. Adjust shelter temperature by turning temperature control knob in either direction.

10. **Fan Speed.** Move evaporator fan speed switch to high or low.


CAUTION
FOR SAFE OPERATION
SEE TM FOR PROPER
INTERNAL AND EXTERNAL
GROUNDING
CAUTION TO START UNIT ON "COOL" MODE AT OFF AMBIENT JUMPER LPCO SWITCH (S-5)
POWER INPUT
CONTROL CIRCUIT BREAKER
OFF
ON
COOLER
WARMER
CONTROL MODULE
COOL
VENT
OFF
ON
TEMPERATURE SELECTOR
OFF
HIGH
LOW
HIGH
LOW
HEAT
COMPR CIRCUIT BKR
EVAPORATOR FAN SPEED
MODE SELECTOR
MODEL
RESET LOW PRESSURE
RESET HIGH PRESSURE

Note

Use **high heat** when **low heat** fails to raise the shelter temperature.

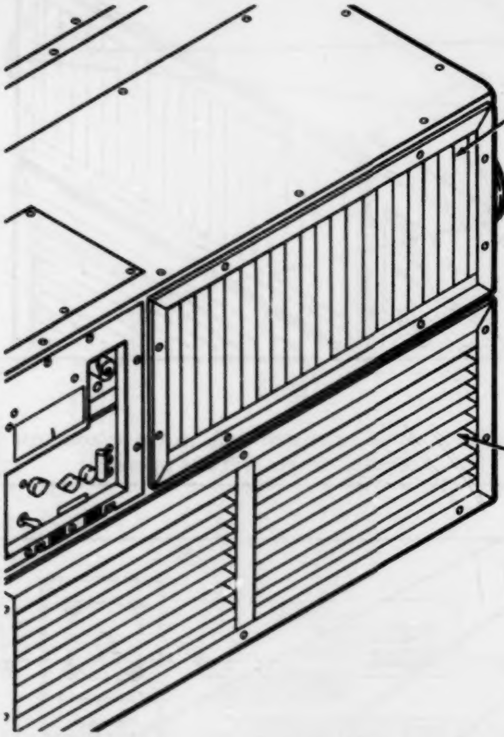
CAUTION

Move to vent to remove heat from electric heaters. Heaters could be damaged by heat buildup

11. **To Stop Heating.** Move mode selector to vent for 5 minutes. After 5 minute vent operation, move switch to off.

A01353
TM5-4120-367-14-101

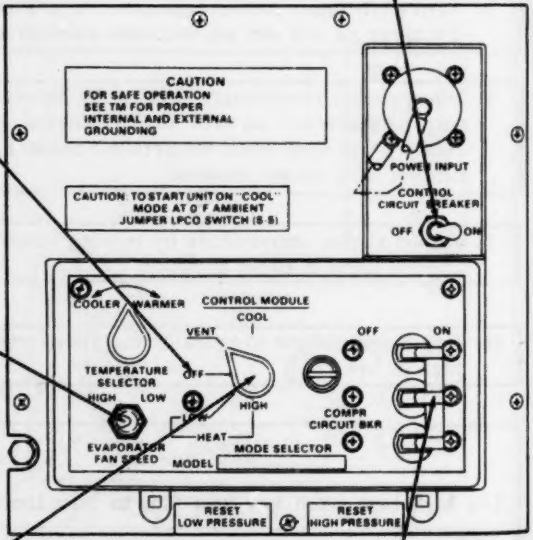
2-7. VENTILATING OPERATION



1. Air Outlet Louvers
Individually Adjustable

2. Fresh Air Inlet Vent Control
Turn up to close vent. Turn down to open vent

3. Inlet Louver
Move up to open. Move down to close


CAUTION
FOR SAFE OPERATION
SEE TM FOR PROPER
INTERNAL AND EXTERNAL
GROUNDING
CAUTION: TO START UNIT ON "COOL" MODE AT 0 F AMBIENT JUMPER LPCO SWITCH (S-5)
POWER INPUT
CONTROL CIRCUIT BREAKER
OFF
ON
COOLER
WARMER
CONTROL MODULE
TEMPERATURE SELECTOR
HIGH
LOW
EVAPORATOR FAN SPEED
COOL
VENT
OFF
LOW
HIGH
HEAT
MODE SELECTOR
MODEL
OFF
ON
COMPR CIRCUIT BKR
RESET LOW PRESSURE
RESET HIGH PRESSURE

4. Control Circuit Breaker ON.

5. Compressor Main Circuit Breaker ON.

6. Mode Selector. Turn mode selector switch to vent.

7. Fan Speed. Move evaporator fan speed to high or low as desired. After 5 seconds air flow can be felt.

8. Stop Vent. Turn mode selector to off.

A01384
TM5-4120-367-14-102

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

NOTE

The air conditioner can be equipped for operation in chemical biological radiological (CBR) environment by connecting filtering equipment to the rectangular covered opening at the lower left side of the rear surface of the unit.

2-8. OPERATION IN EXTREME COLD

This task covers:

a. Operation in extreme cold.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power ON
Installed in shelter

Special Environmental Conditions

Below 0°F (-18°C)

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Operator

LOCATION/ITEM	ACTION	REMARKS
GENERAL	The air conditioner is designed to operate on the heating cycle in ambient temperatures as low as minus 50° F (-45.5° C) and on cooling cycle with 0° F (-18° C) air entering the condenser and 70° F (21° C) air entering the evaporator. **CAUTION** Do not disturb wiring during cold weather unless absolutely necessary. Cold temperatures make wiring and insulation brittle and easily broken.	
BEFORE OPERATION	a. Before starting on cooling cycle, be sure cover is rolled from condenser air intake and discharge. b. Clear all ice and snow from openings. c. Be sure all dampers are in operating condition. d. To start unit on COOL mode at 0° F (-18° C) ambient (min. operating temp.) jumper LPCO switch. Refer to paragraph 3-7.	
AFTER OPERATION	Install cover over condenser air intake and discharge openings. **CAUTION** Do not disturb wiring during cold weather unless absolutely necessary. Cold temperatures make wiring and insulation brittle and easily broken.	

2-9. OPERATION IN EXTREME HEAT

This task covers:

a. Operation in extreme heat

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power ON
Installed in shelter

Special Environmental Conditions

Above 120°F (49°C)

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Operator

LOCATION/ITEM	ACTION	REMARKS
GENERAL	a. The air conditioner is designed to operate satisfactorily at temperatures up to plus 120° F (49° C). b. If unit is operated at condenser inlet temperatures higher than 120° F (49° C) the cooling capacity will be lowered and long periods of operation at extended temperatures may cause condenser or condenser fan motor to overheat and trip their internal overload switches or the high pressure cutout switch will shut the unit off.	
FILTERS	a. To maintain the highest capacity of the unit, the return air filter and fresh air screen should be cleaned weekly or more often if necessary. b. Dirty filters reduce the flow of air across the evaporator coil, thereby reducing the capacity of the air conditioner.	
GUARDS AND LOUVERS	Keep all guards and louvers clean and free of any obstructions to maintain full air flow through the air conditioner.	
COILS	Clean evaporator and condenser coils as frequently as necessary to prevent dirt or other matter from obstructing the air flow.	

2-10. OPERATION IN DUSTY OR SANDY AREAS

This task covers:

a. Operation in dusty or sandy areas.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power ON
Installed in shelter

Special Environmental Conditions

Extreme dusty or sandy

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Operator

LOCATION/ITEM	ACTION	REMARKS
PROTECTION	a. Shield the air conditioner from dust as much as possible. b. Take advantage of any natural barriers which offer protection.	
CLEANING	a. Keep the air conditioner as clean as possible. b. Pay particular attention to the louvers, filters, coils and electrical components.	
	CAUTION Never operate the unit without having the air filters in place.	
FILTERS AND COILS	a. Under extremely dusty or sandy conditions, the louvers, filters, coils, and electrical components must be serviced more often. b. The condenser coil is subjected to ambient air. Therefore, it requires cleaning more often than the evaporator coil.	

2-11. OPERATION UNDER RAINY OR HUMID CONDITIONS

This task covers:

a. Operation under rainy or humid conditions

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power ON
Installed in shelter

Special Environmental Conditions

Heavy rain

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Operator

LOCATION/ITEM	ACTION	REMARKS
COVER EQUIPMENT	**WARNING** Make sure power is disconnected from air conditioner before touching any wiring or other electrical parts. a. Take special precautions to keep equipment dry. If installed outdoors, cover the equipment with a waterproof cover when it is not in use.	
KEEP DRY	b. Remove cover during the dry periods. Take all necessary precautions to keep electric components free from moisture.	

2-12. OPERATION IN SALT WATER AREAS

This task covers:

a. Operation in salt water areas.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power ON
Installed in shelter

Special Environmental Conditions

Salt water spray

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Operator

LOCATION/ITEM	ACTION	REMARKS
WASH	**WARNING** Disconnect power source prior to washing the air conditioner. a. Wash the exterior and condenser section of the unit, particularly condenser air discharge louver control mechanism. Refer to paragraph 5-25. b. Be careful not to damage electrical system with water. c. Special attention must be given to prevent rust and corrosion.	
PAINTING	a. Paint all exposed areas where paint has cracked, peeled, or blistered. b. Coat all exposed areas of polished metal with a light coat of grease.	

CHAPTER 3

REPAIR PARTS, SERVICE, AND PREVENTIVE MAINTENANCE

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

3-1. COMMON TOOLS AND EQUIPMENT

a. For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

b. Tool Kit, Service, refrigeration Unit, NSN 5180-00-596-1474, contains hand tools and equipment used for air conditioner maintenance. The following items not contained in the refrigeration unit tool kit are also required for air conditioner maintenance.

Description	National Stock Number
Brush, Bristle	7520-00-223-8000
Brush, Wire	7920-00-282-9246
Bucket	7240-00-137-1609
Heat Gun	4940-01-042-4855
Multimeter	6625-00-553-0142
Nitrogen Regulator	6685-00-449-7484
Pliers, Long Round Nose	5120-00-268-3579
Rubber Gloves	8415-00-266-8677
Safety Goggles	4240-00-052-3776
Screwdriver, Cross Tip No. 2 1 Inch Long Blade	5120-00-227-7293
Screwdriver, Offset, Cross Tip No. 1	5120-00-256-9014

3-2. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

No special tools, TMDE, or support equipment is required.

3-3. REPAIR PARTS

Repair parts are listed and illustrated in Repair Parts and Special Tools List (RPSTL) TM5-4120-367-24P.

Section II. SERVICE UPON RECEIPT

3-4. UNPACKING

This task covers:

a. Unpacking
b. Inspection

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Personnel Required

Organizational Support Maintenance (2 rqr)

Equipment Description

Assembled, Ready for Installation

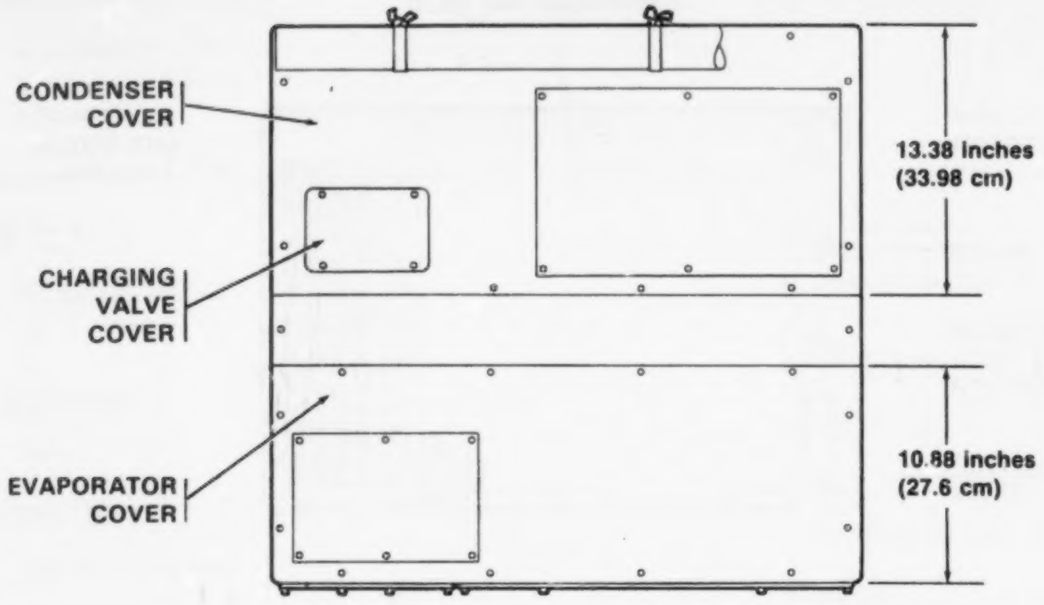
Special Environmental Conditions

None

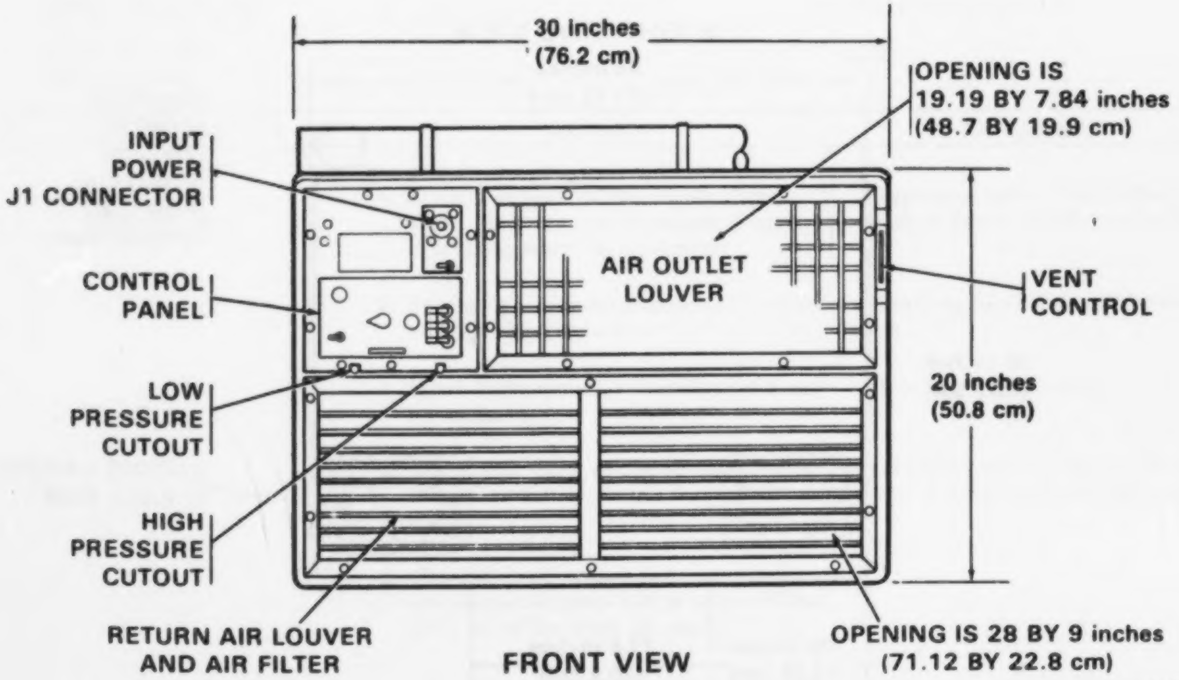
Troubleshooting References

None

LOCATION/ITEM	ACTION	REMARKS
1. Container	a. Cut steel strapping	
Air Conditioner	b. Remove plastic wrap	
	c. Lay unit on side with help of assistant	
	d. Remove four mounting bolts.	Keep bolts for permanent mounting.
INSPECTION	a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.	
	b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of TM 38-750.	
	c. Check to see whether the equipment has been modified.	
	d. Report any modifications.	

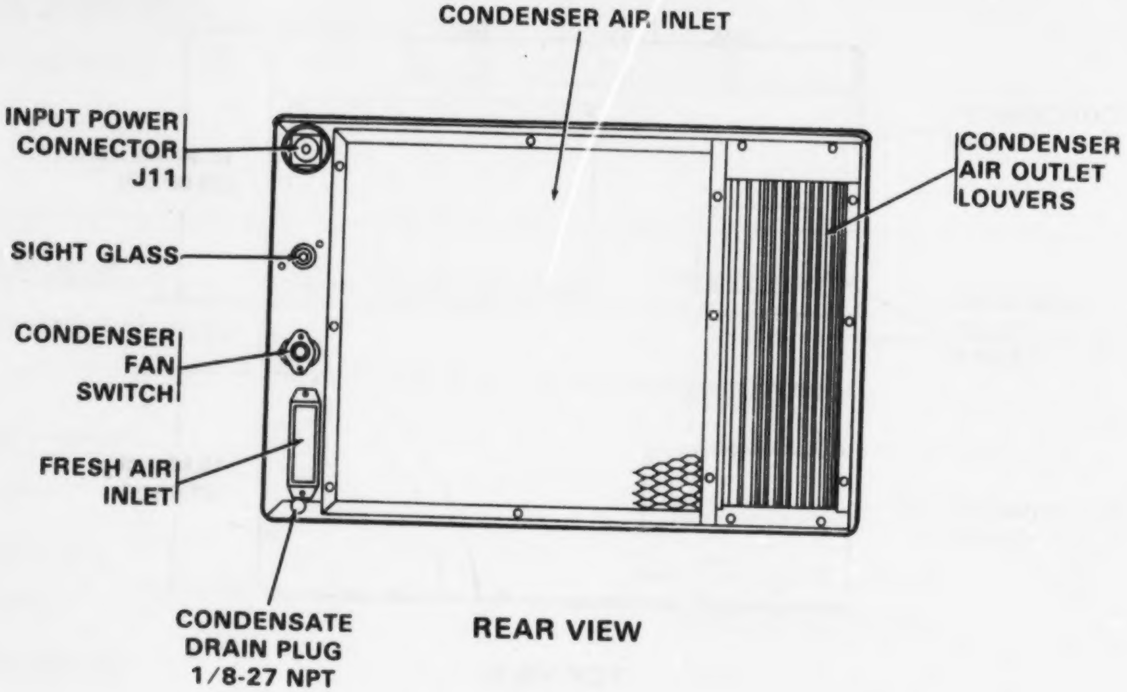

CONDENSER COVER
CHARGING VALVE COVER
EVAPORATOR COVER
13.38 inches (33.98 cm)
10.88 inches (27.6 cm)

TOP VIEW


30 inches (76.2 cm)
OPENING IS 19.19 BY 7.84 inches (48.7 BY 19.9 cm)
INPUT POWER J1 CONNECTOR
CONTROL PANEL
AIR OUTLET LOUVER
VENT CONTROL
LOW PRESSURE CUTOUT
20 inches (50.8 cm)
HIGH PRESSURE CUTOUT
RETURN AIR LOUVER AND AIR FILTER
OPENING IS 28 BY 9 inches (71.12 BY 22.8 cm)
A01330
TM5-4120-367-14-78

FRONT VIEW

Figure 3-1. Installation Dimensions (Sheet 1 of 2)


CONDENSER AIR INLET
INPUT POWER CONNECTOR J11
SIGHT GLASS
CONDENSER FAN SWITCH
FRESH AIR INLET
CONDENSATE DRAIN PLUG 1/8-27 NPT
CONDENSER AIR OUTLET LOUVERS

REAR VIEW

RIGHT SIDE VIEW

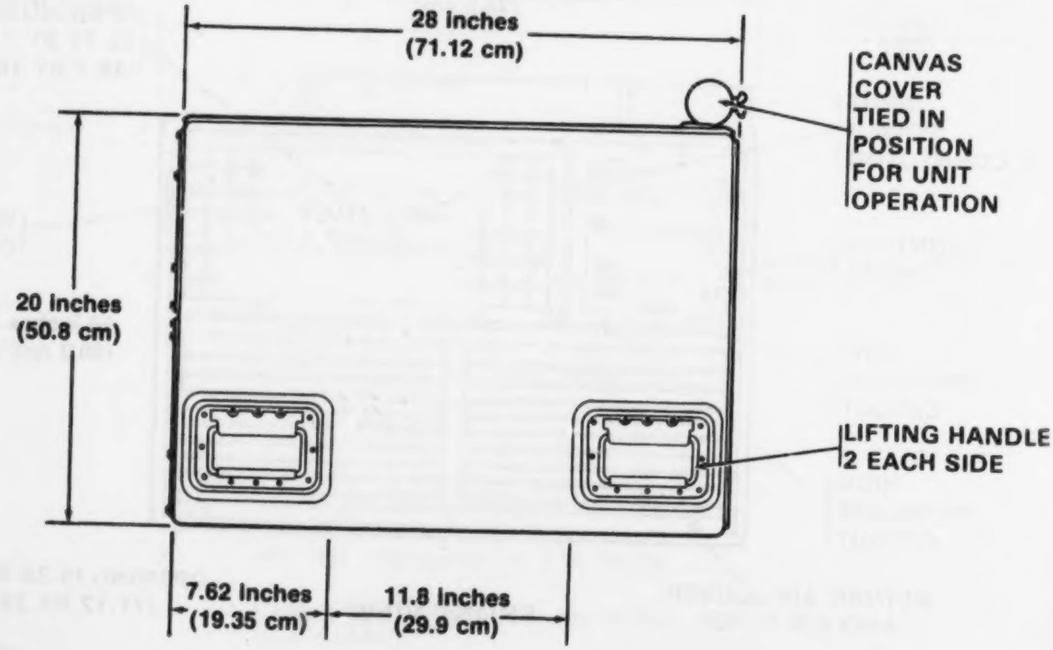

28 inches (71.12 cm)
CANVAS COVER TIED IN POSITION FOR UNIT OPERATION
20 inches (50.8 cm)
LIFTING HANDLE 2 EACH SIDE
7.62 inches (19.35 cm)
11.8 inches (29.9 cm)

Figure 3-1. Installation Dimensions (Sheet 2 of 2)

A01331
TM5-4120-367-14-79

3-5. INSTALLATION OR REMOVAL

This task covers:

a. Installation
b. Check of Installation
c. Removal

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

Hoist or Wrecker Sling

Materials/Parts

Foam Insulating material
Pressure sensitive tape
#10 AWG Ground Wire
Mounting Bracket
Shims material

Personnel Required

Organizational Support Maintenance (2 rqr)

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

LOCATION/ITEM	ACTION	REMARKS
1. Shelter Air conditioner	a. Select a support which allows slight slope. No more than 5 degrees front to rear (Evaporator to condenser)	Evaporator higher than condenser to allow flow of condensate water.
	b. See figure 3-1 for dimensions and location of mounting hardware.	Mounting hardware supplied with unit.
	c. Leave approximately 24 inches (60.8 cm) for maintenance.	More space is desirable.
	d. Check that there will be an unobstructed flow of outside air to and from condenser coil.	Keep all sources of heat at least 10 feet (30.4 m) from condenser coil.
	e. Check that no source of dangerous or objectionable fumes will be within 10 feet (30.4 m) of the fresh air intake.	

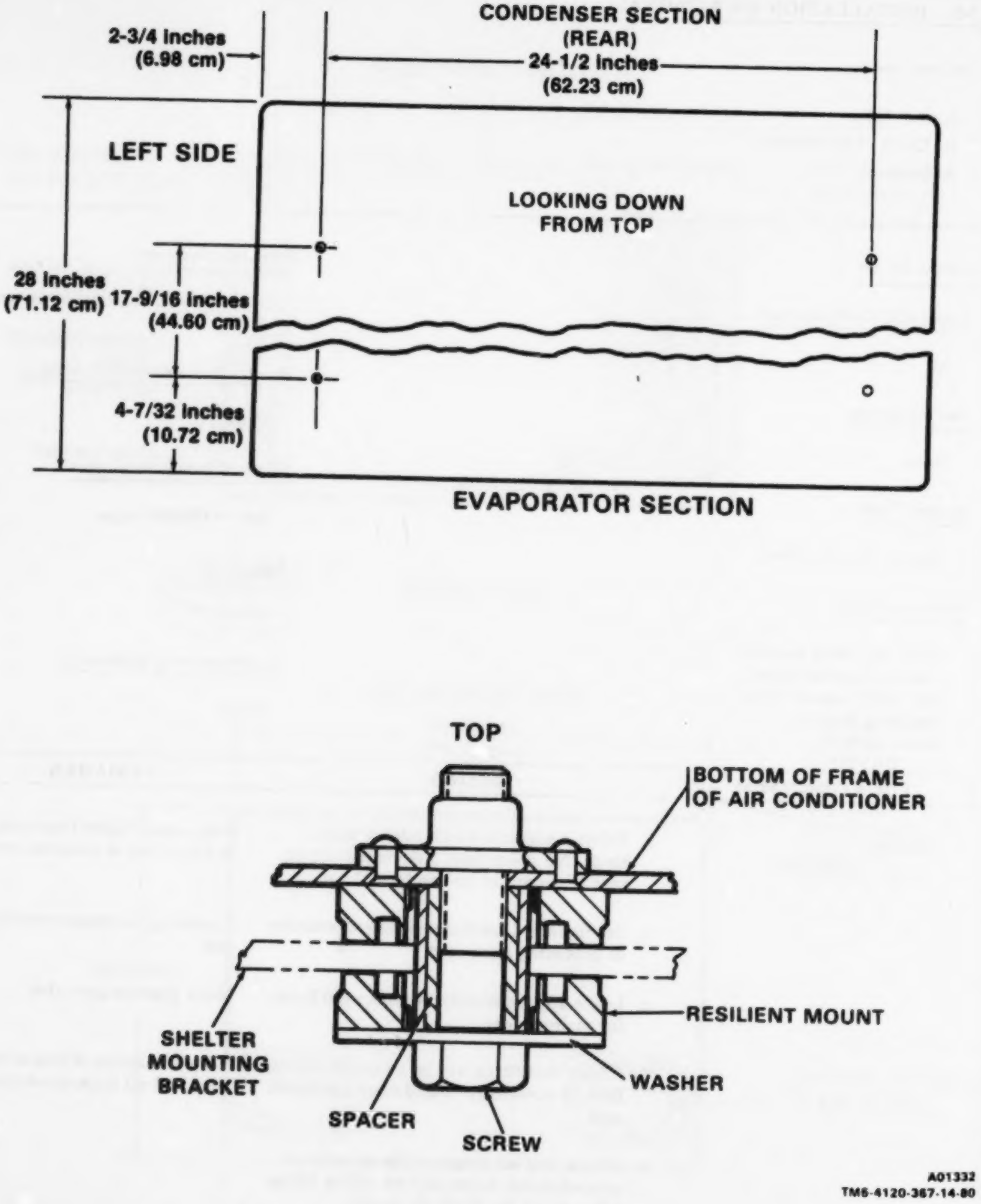

CONDENSER SECTION
(REAR)
2-3/4 inches
(6.98 cm)
24-1/2 inches
(62.23 cm)
LEFT SIDE
LOOKING DOWN
FROM TOP
28 inches
(71.12 cm)
17-9/16 inches
(44.60 cm)
4-7/32 inches
(10.72 cm)
EVAPORATOR SECTION
TOP
BOTTOM OF FRAME
OF AIR CONDITIONER
RESILIENT MOUNT
SHELTER
MOUNTING
BRACKET
WASHER
SPACER
SCREW
A01332
TM5-4120-367-14-80

Figure 3-2. Mounting Hole Location

Table 3-1. AC POWER SUPPLY REQUIREMENTS

Model	Voltage	Phase	Hertz
F18H	230	Single	50/60
F18H-3	208	3	50/60
F18H-4	208	3	400

Table 3-2. J1 AND J11 WIRING

	Connector		Schematic
Model	J11	J1	*
F18H	Fig 3-3	Fig 3-4	FO-1
F18H-3	Fig 3-5	Fig 3-6	FO-2
F18H-4	Fig 3-5	Fig 3-6	FO-3

* Foldout located at back of manual.

NOTE

Two input power connectors are provided on the air conditioner. Connector J1 is located on the evaporator section above the control module. Connector J11 is located on the condenser section right above the sight glass. Wiring at terminal boards TB3 must be connected to the connector which is to be used for input power.

NOTE

It may be necessary to isolate neutral from ground in the air conditioner to prevent electrical interference. It will be necessary to remove the air conditioner from the installed position to remove the jumper. If possible determine the possibilities of electrical interference before installing the air conditioner.

Table 3-3. CONNECTOR PIN WIRING, MODEL F18H

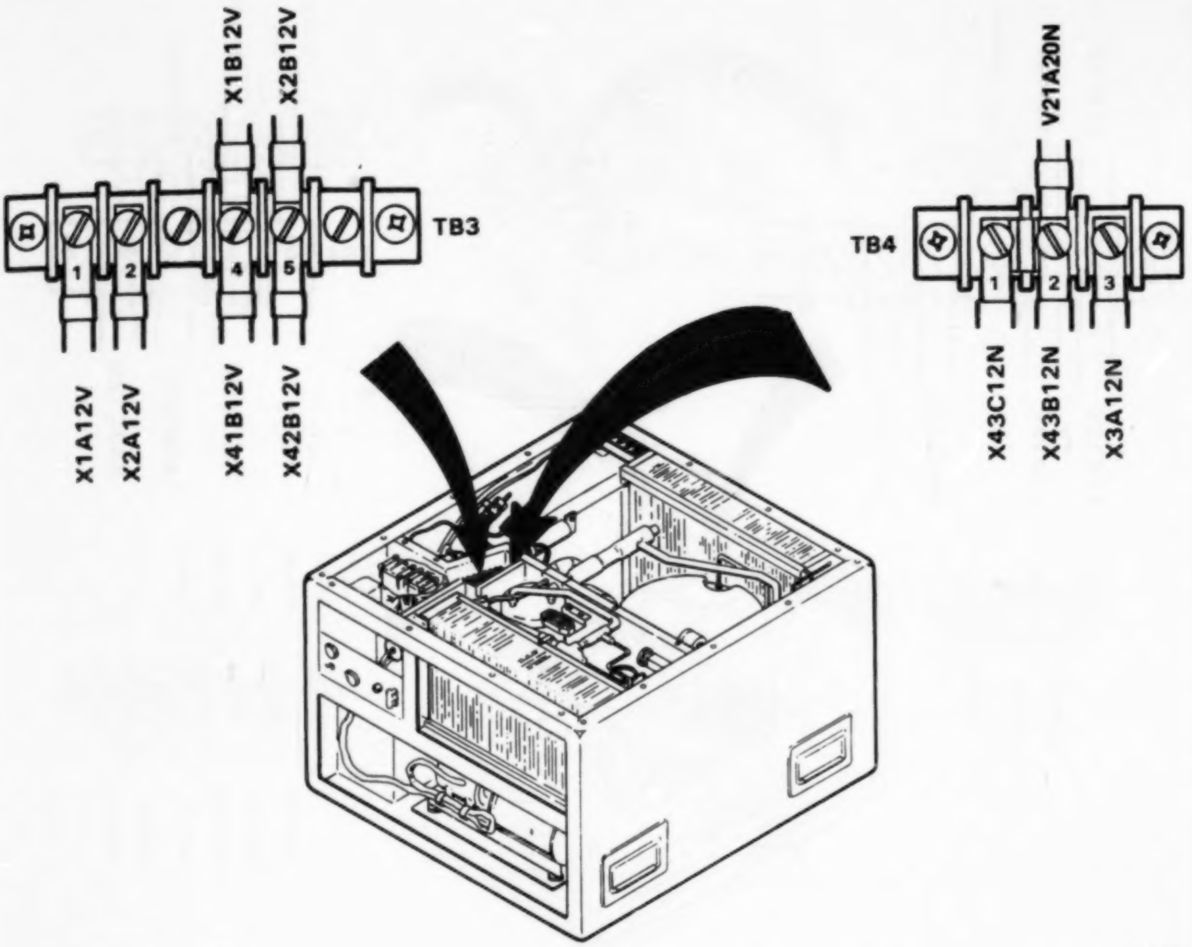
Pin	Internal Wiring Connection J1 and J11
A	Positive
B	Neutral
C	Blank not used
D	Ground
E	Blank not used

Table 3-4. PHASE ROTATION MODELS F18H-3 AND F18H-4

Pin	Internal Wiring Connection J1 And J11
A	Phase A
B	Phase B
C	Phase C
D	Ground
E	Blank not used.

INSTALLATION OR REMOVAL CONTINUED

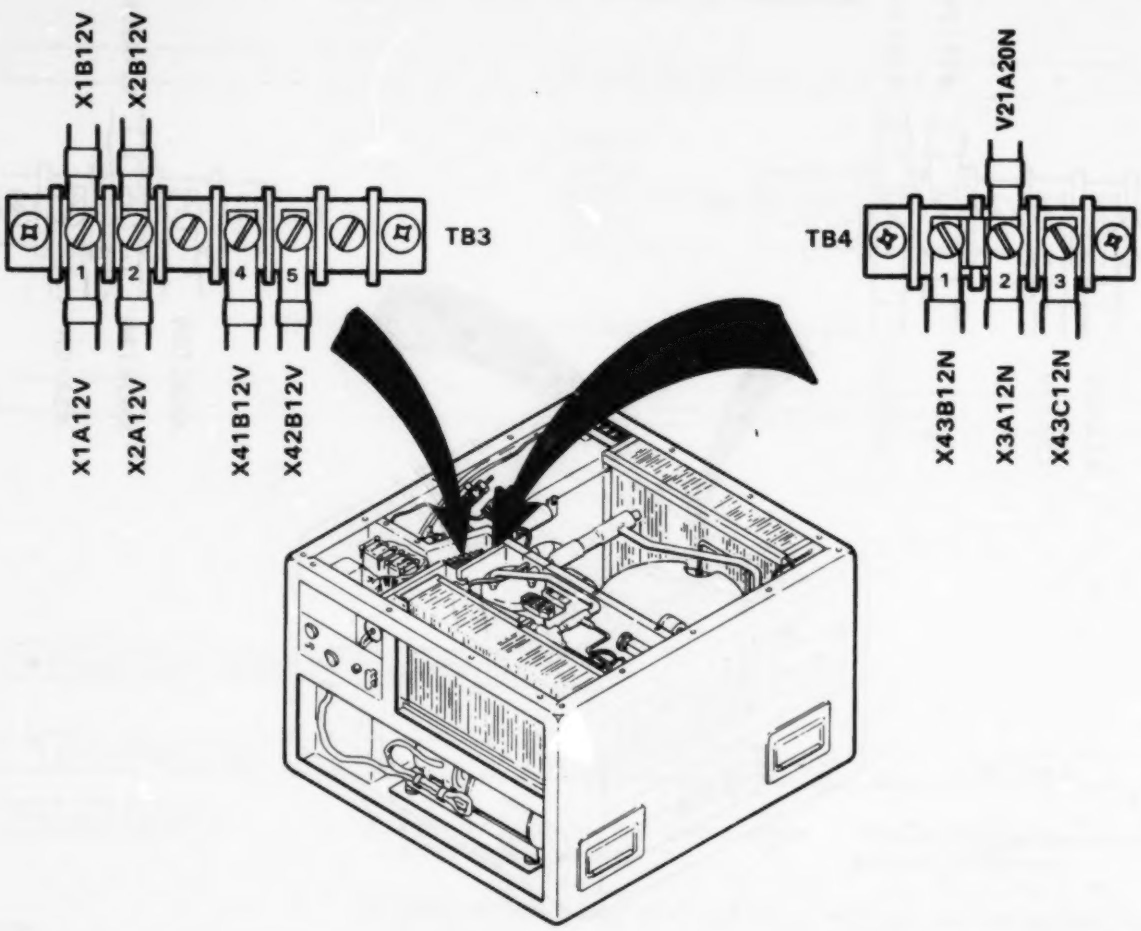
LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	f. Refer to table 3-1 for electric power supply requirements.	There are three models each with a different requirement.
	g. Determine which input power connector is to be used.	Rewire unit at terminal boards TB3 and TB4 if necessary.
	WARNING Do not wire connectors J1 and J11 for use at the same time, nor apply power source to connectors J1 and J11 at same time. You could have unknown HOT connector, radio interference, or you could place two separate power supplies in opposition to each other.	
	h. Remove all three top covers.	See tables 3-2, 3-3, and 3-4.


X1B12V
X2B12V
TB3
1
2
4
5
X1A12V
X2A12V
X41B12V
X42B12V
V21A20N
TB4
1
2
3
X43C12N
X43B12N
X3A12N

A01333
TM5-4120-367-14-81

Figure 3-3. Connector J11 Wired at Terminal Board TB3 (Single Phase)

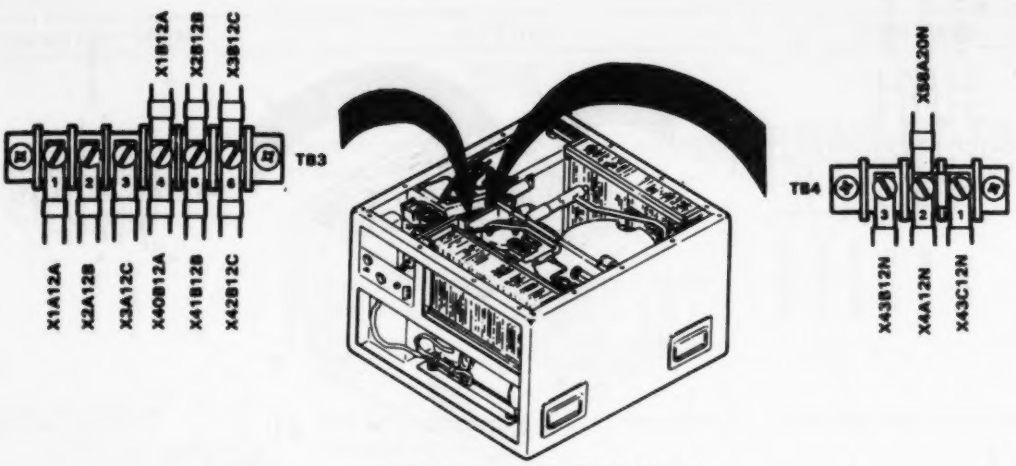
LOCATION/ITEM	ACTION	REMARKS
	OR	
Connector J11 single phase, terminal board TB3	a. Leads X1B12V and X2B12V must be connected to terminal board TB3 terminals 4 and 5	Power supply connected to connector J11 single phase
	AND	
Connector J11 single phase, terminal board TB4	b. Wire X43B12N must be connected to terminal 2. Wire X3A12N connected to terminal 3.	FO-1 Replace all removed covers.


X1B12V
X2B12V
TB3
1
2
4
5
X1A12V
X2A12V
X41B12V
X42B12V
V21A20N
TB4
1
2
3
X43B12N
X3A12N
X43C12N

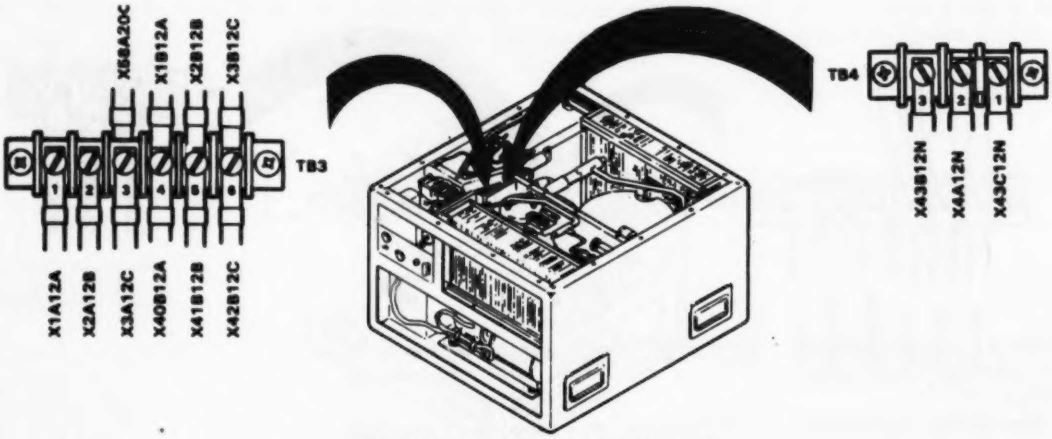
A01334
TM5-4120-367-14-82

Figure 3-4. Connector J1 Wired at Terminal Board TB3 (Single Phase)

LOCATION/ITEM	ACTION	REMARKS
	OR	
Connector J1 single phase terminal board TB3	a. Leads X1B12V and X2B12V must be connected to terminal board TB3 terminals 1 and 2.	Power supply connected to connector J1 single phase.
	AND	
Connector J1 single phase, terminal board TB4	b. Wire X3A12N must be connected to terminal 2. Wire X43B12N connected to terminal 3.	FO-1. Replace all removed covers.


X1B12A
X2B12B
X3B12C
TB3
1
2
3
4
5
6
X1A12A
X2A12B
X3A12C
X40B12A
X41B12B
X42B12C
X58A20N
TB4
3
2
1
X43B12N
X4A12N
X43C12N

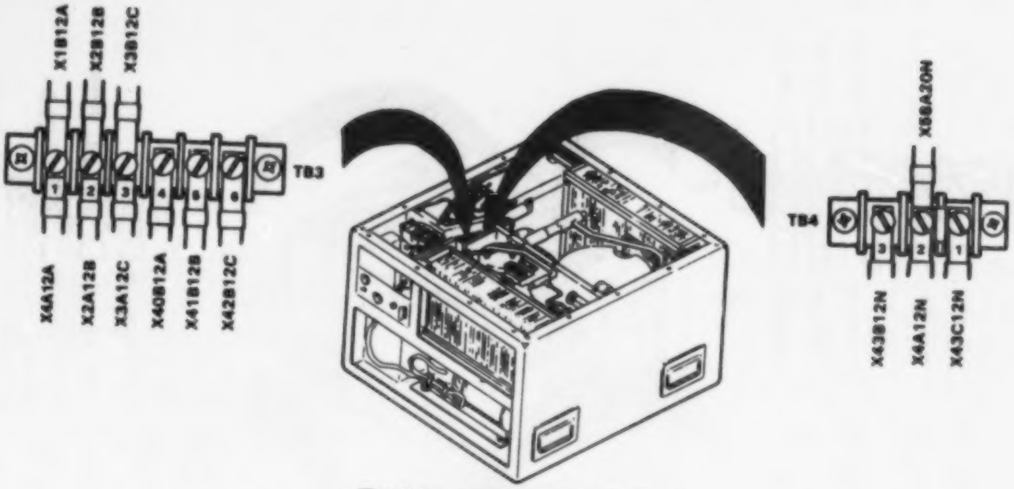
F18H-3 and F18H-4


X58A20C
X1B12A
X2B12B
X3B12C
TB3
1
2
3
4
5
6
X1A12A
X2A12B
X3A12C
X40B12A
X41B12B
X42B12C
TB4
3
2
1
X43B12N
X4A12N
X43C12N

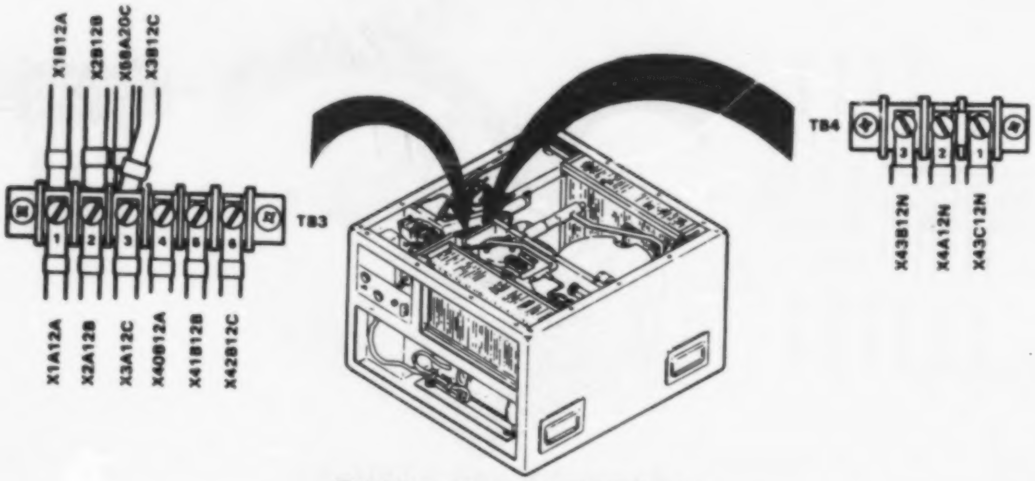
F18H-3A and F18H-4A

Figure 3-5. Connector J11 Wired at Terminal Board TB3 (Three Phase)

LOCATION/ITEM	ACTION	REMARKS
	OR	
Connector J11 3 phase terminal board TB3	a. Leads X1B12A, X2B12B, and X3B12C must be connected to terminal board TB3 terminals 4, 5, and 6.	Power supply connected to connector J11 3 phase
	AND	
Connector J11 3 phase, terminal board TB4	b. Wire X43B12N must be connected to terminal 2. Wire X4A12N connected to terminal 3.	FO-1. Replace all removed covers.


X1B12A
X2B12B
X3B12C
1
2
3
4
5
6
TB3
X4A12A
X2A12B
X3A12C
X40B12A
X41B12B
X42B12C
X8A20N
TB4
3
2
1
X43B12N
X4A12N
X43C12N

F18H-3 and F18H-4

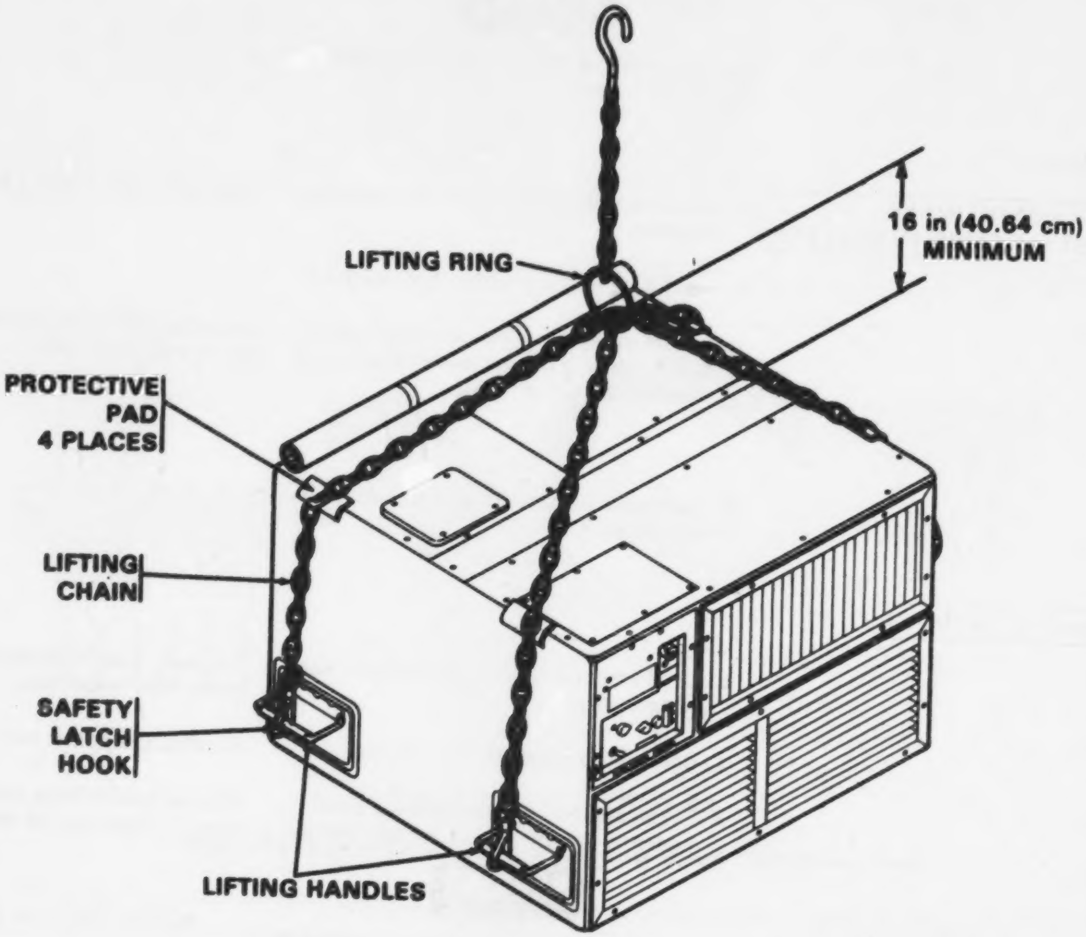

X1B12A
X2B12B
X8A20C
X3B12C
1
2
3
4
5
6
TB3
X1A12A
X2A12B
X3A12C
X40B12A
X41B12B
X42B12C
TB4
3
2
1
X43B12N
X4A12N
X43C12N

F18H-3A and F18H-4A

Figure 3-6. Connector J1 Wired at Terminal Board TB3 (Three Phase)

LOCATION/ITEM	ACTION	REMARKS
Connector J1 3 phase, terminal board TB3.	a. Leads X1B12A, X2B12B, and X3B12C must be connected to terminal board TB3 terminals 1, 2, and 3.	Power supply connected to connector J1 3 phase
	AND	
Connector J1 3 phase, terminal board TB4	b. Wire X4A12N must be connected to terminal 2. Wire X43B12N connected to terminal 3.	FO-2 or FO-3

LOCATION/ITEM	ACTION	REMARKS
	NOTE Check on possibilities of removing jumper on terminal board TB4 at this time.	
	WARNING Use care in lifting. Air conditioner weighs 256 lbs. (116.1 kg)	
Shelter **AIR CONDITIONER INSTALLATION IN SHELTER**	a. Lift air conditioner to top of the mounting brackets.	Each side has two lifting handles.
	b. Use lifting sling if possible. See figure 3-7.	
	c. Locate evaporator section inside shelter. Leave space to remove cover from top of evaporator section	Use care, unit is not mounted or secure and could shift.
	d. Level unit on bracket; side to side. Shim as necessary.	
INSTALLATION		
	e. Level unit on bracket, front to back. Shim as necessary.	No more than 5°, Condenser lower than evaporator.
	f. Bolt unit to brackets, four places.	Hardware supplied with unit.
	g. Fill in and seal area around air conditioner to prevent loss of conditioned air.	Flexible plastic foam and pressure sensitive tape may be used.
	WARNING For safe operation, user must connect #10 AWG ground wire to the external ground connection. Make certain that shelter is properly grounded.	
	h. Connect #10 AWG ground wire from the shelter ground to air conditioner ground stud.	Ground is located below and to side of control panel.


16 in (40.64 cm)
MINIMUM
LIFTING RING
PROTECTIVE PAD 4 PLACES
LIFTING CHAIN
SAFETY LATCH HOOK
LIFTING HANDLES

GROSS WEIGHT F18H—278 lbs (126.1 kg)
F18H-3—270 lbs (122.5 kg)
F18H-4—265 lbs (120.2 kg)

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Figure 3-7. Lifting Using Slings

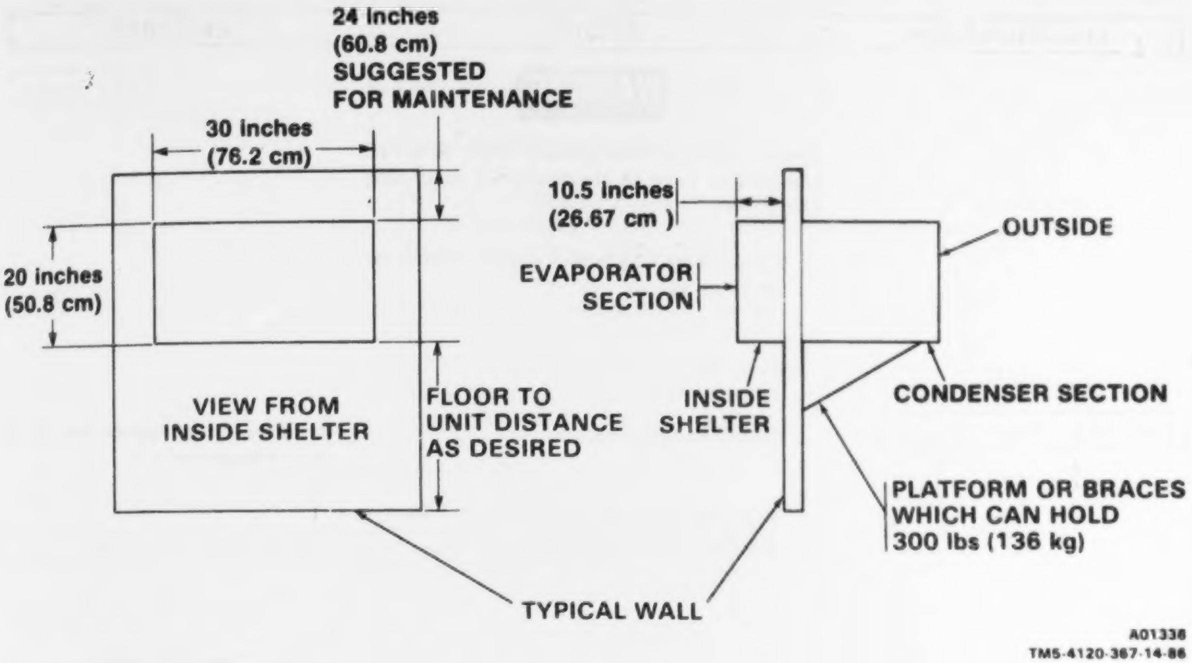
24 inches
(60.8 cm)
SUGGESTED
FOR MAINTENANCE
30 inches
(76.2 cm)
20 inches
(50.8 cm)
VIEW FROM
INSIDE SHELTER
FLOOR TO
UNIT DISTANCE
AS DESIRED
10.5 inches
(26.67 cm)
EVAPORATOR
SECTION
OUTSIDE
INSIDE
SHELTER
CONDENSER SECTION
PLATFORM OR BRACES
WHICH CAN HOLD
300 lbs (136 kg)
TYPICAL WALL
A01338
TM5-4120-367-14-86

Figure 3-8. Wall Space Required

INSTALLATION Continued

LOCATION/ITEM	ACTION	REMARKS
Shelter		
Air Conditioner		
DRAIN LINE	a. Connect condensate drain line	Rear of unit, below fresh air intake 1/8 - 27 NPT
CHECK POWER SUPPLY	a. Check incoming power supply	
	1. Model F18H; check wiring to connector pins of J1 or J11 mating connector.	Table 3-3. Correct at power supply or main circuit breaker.
	OR	
	2. Models F18H-3 and F18H-4; check phase rotation to connector pins of J1 or J11 mating connector.	Table 3-4. Correct at power supply or main circuit breaker.

LOCATION/ITEM	ACTION	REMARKS
	WARNING Power supply circuit breaker must be OFF. Installation must be checked prior to turning ON power.	
	b. Connect mating power supply connector to J1 or J11.	
INSTALLATION CHECK	a. Check installation.	Unit ready for operation check-out. Paragraph 3-6.
	b. Perform steps in paragraph 3-6 before placing unit in operation.	
REMOVAL	a. Remove power at main circuit breaker.	**WARNING**
	b. Disconnect power cable at air conditioner.	High voltage can kill.
	c. Remove insulating material from area around air conditioner.	
	d. Connect sling to lifting handles (4)	**WARNING**
	e. Position hoist (wrecker) next to shelter in order to lift air conditioner.	Air conditioner weighs 256 pounds (116.1 kg)
	f. Connect sling to two handles (one either side) on condenser section.	
	CAUTION The maintenance personnel MUST be visible to hoist or wrecker operator and in a position to guide air conditioner away from shelter.	

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	g. Connect sling to hoist or wrecker.	
	h. Remove mounting bolts.	
	i. Push air conditioner out of the conditioned area using the sling and hoist to hold and steady air conditioner.	Only push to point where sling can be hooked to front two handles.
	j. Attach sling to the front two handles	
	k. Lift air conditioner from mounting bracket and place on truck, transport trailer, or on the ground.	
	l. Remove sling.	

3-6. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT

This task covers:

a. Rechecking the installation
b. Operation of unit

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Personnel Required

Organizational maintenance

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

PRELIMINARY SERVICING CONTINUED

LOCATION/ITEM	ACTION	REMARKS
SHELTER		
Air conditioner	a. Check that fabric cover is rolled up and secure.	
	b. Check that airflow to and from condenser is free of anything that will block airflow.	
	c. Keep ALL sources of heat at least 10 feet (30.4m) from condenser coil.	
	d. Keep ALL sources of dangerous or objectionable fumes at least 10 feet (30.4 m) from fresh air intake.	Automobile or truck exhaust; refuse containers, fuel containers, etc.
	e. Check electrical connections.	
	f. See Chapter 2, Sections I and III	
	g. Operate unit (1) Cool, high and low (2) Heat, high and low (3) Vent, high and low (4) Fresh air open (5) Fresh air closed	
	h. Check if air conditioner electrically interferes with other shelter electrical equipment.	Ground can be isolated from neutral.
	i. Refer to Paragraph 3-7 for neutral removal procedure.	

3-7. REMOVE NEUTRAL JUMPER (GROUND ISOLATION)

This task covers:

a. Removal of neutral jumper

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Personnel Required

Refrigeration specialist

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

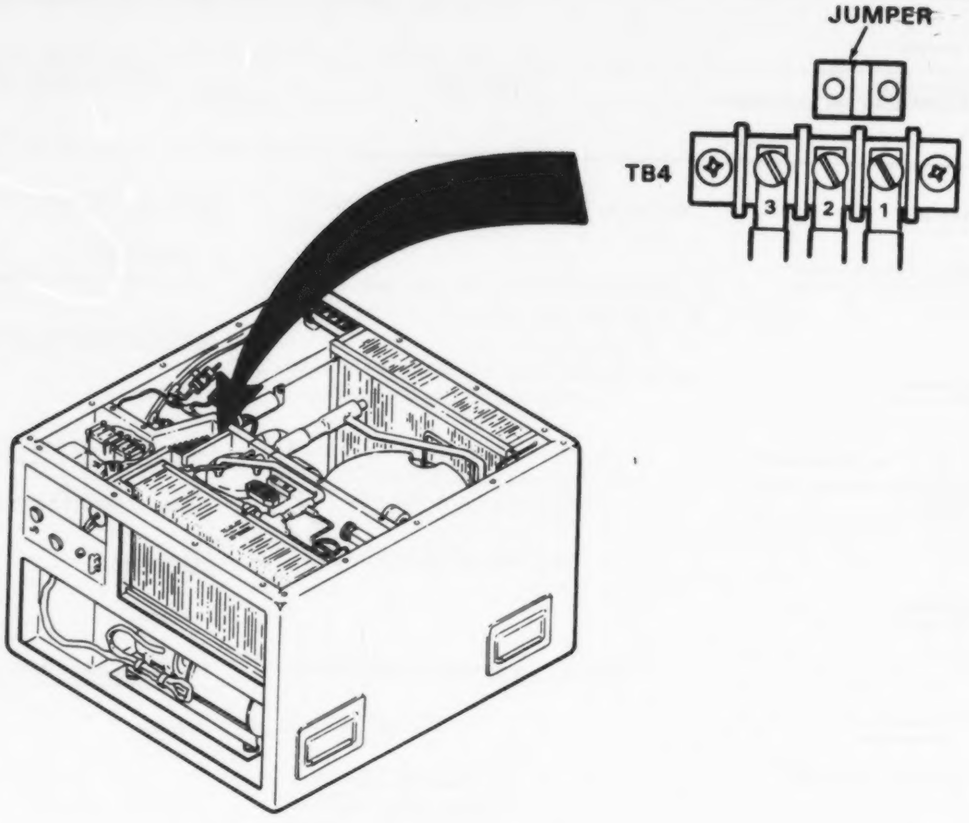

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Figure 3-9. Neutral Jumper Removal

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. If unit is installed it must be removed for this procedure.	Paragraph 3-5.
	c. Remove all three top covers.	
	d. Remove jumper from terminal board TB4, terminals 1 and 2.	

NEUTRAL JUMPER Continued

REMOVAL

e. Place tag on air conditioner to indicate that NEUTRAL jumper has been removed.

f. Replace top covers.

g. Install air conditioner. Paragraph 3-5

h. Double check that unit is grounded.

3-8. LOW PRESSURE CUTOUT JUMPER

This task covers:

a. Jumper across Low Pressure Cutout (LPCO)

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Personnel Required

Utilities Equipment Repairer

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

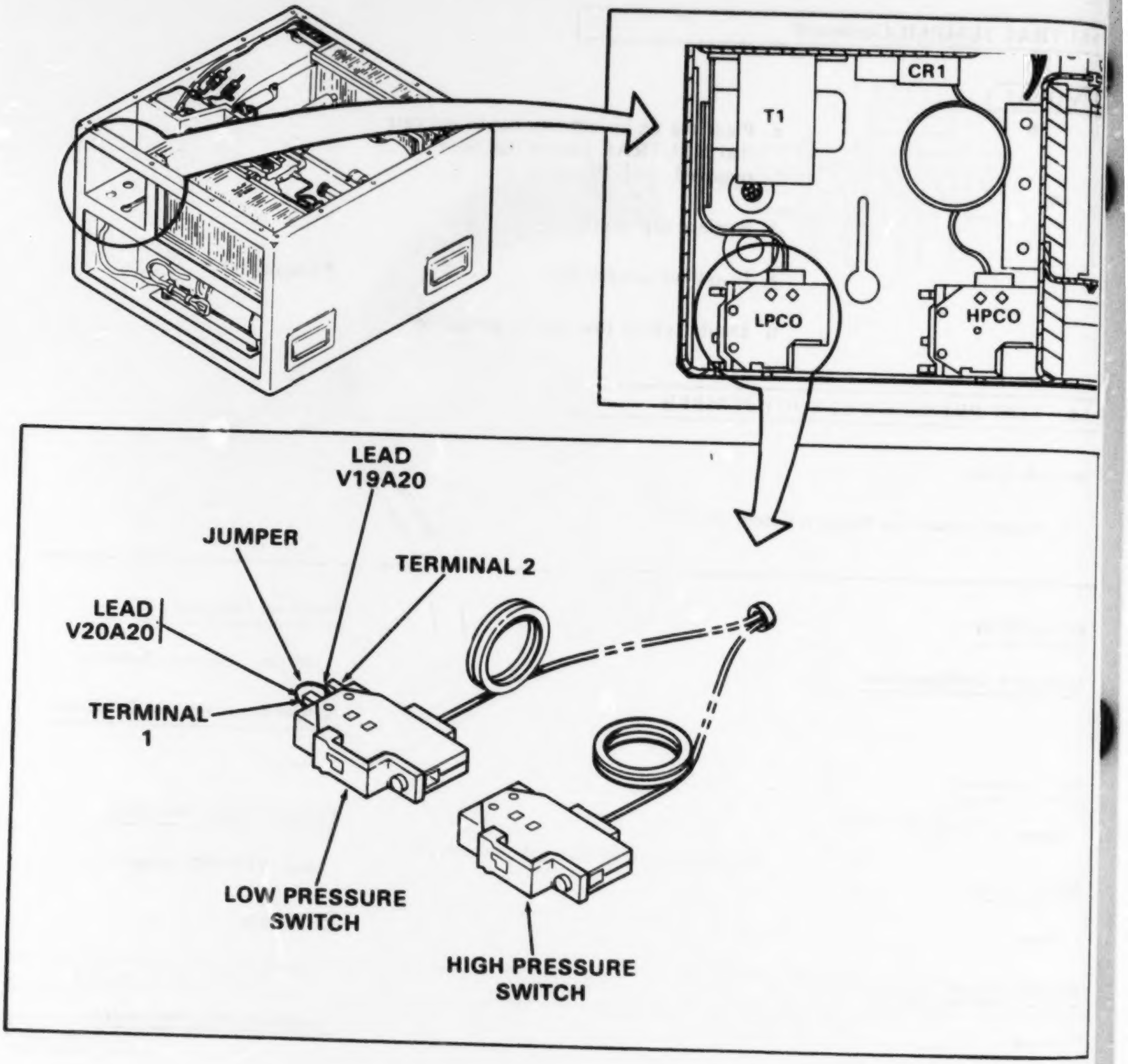
CR1
T1
LPCO
HPCO
LEAD
V19A20
JUMPER
TERMINAL 2
LEAD
V20A20
TERMINAL
1
LOW PRESSURE
SWITCH
HIGH PRESSURE
SWITCH

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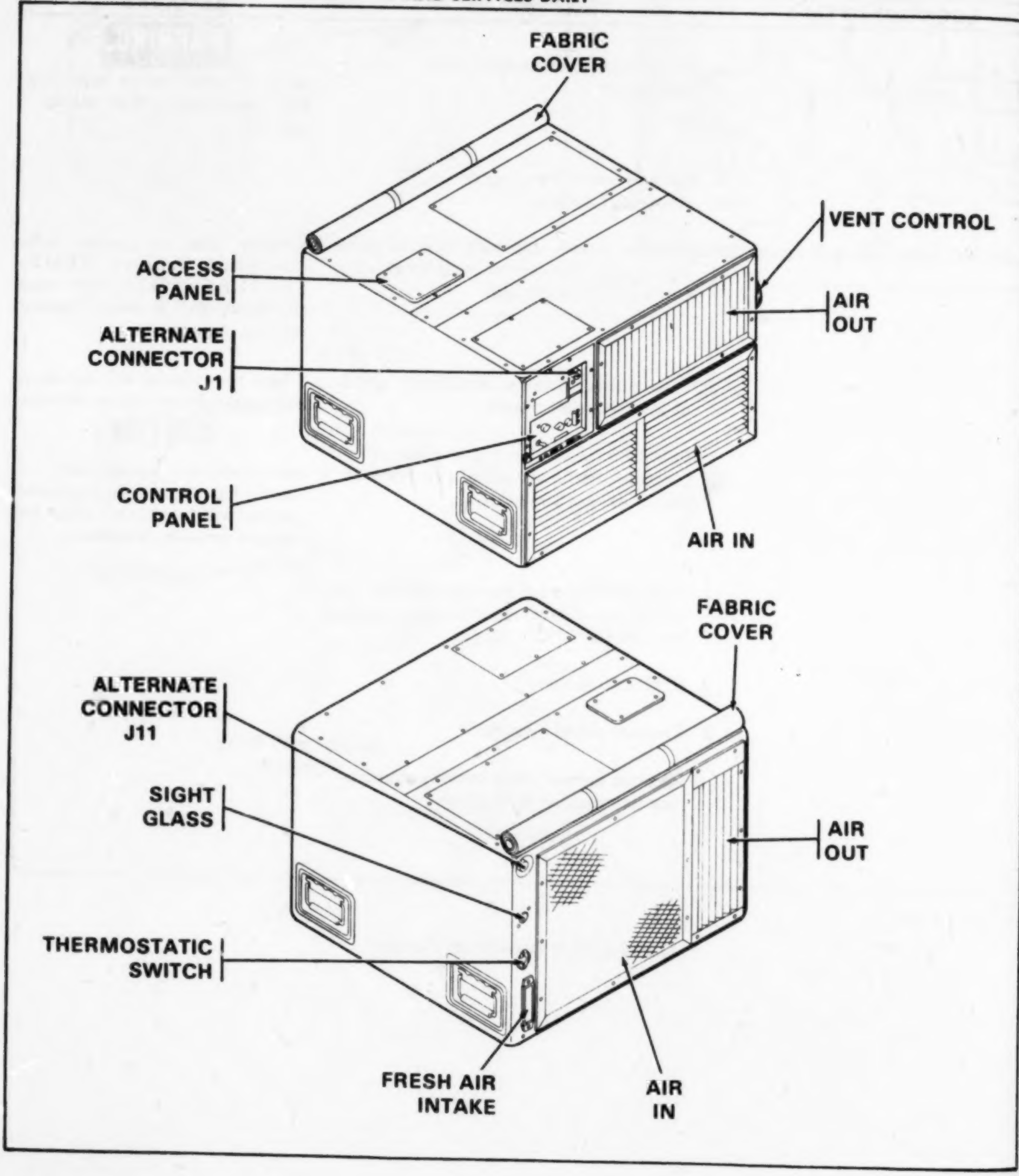
Figure 3-10. Jumper Across LPCO

LPCO JUMPER Continued

LOCATION/ITEM	ACTION	REMARKS
LPCO Jumper	a. Disconnect power supply to air conditioner	**WARNING** Shut off power before beginning any maintenance. High voltage can kill.
	b. Remove cover from top of evaporator section.	
	c. Remove screws and pull control panel from frame. Use care to avoid breaking or kinking the sensing line.	Sensing line is copper tube connected between TEMPERATURE SELECTOR and SENSING BULB which is behind the return air louver.
	d. Place jumper between terminals 1 and 2 of low pressure contact	Check that jumper will not short out against frame of control panel.
	e. Fabricate CAUTION tag to place on control panel to show that low pressure cutout has been bypassed.	**CAUTION** Air conditioner low pressure cutout has been bypassed. Compressor will not shut off under low suction pressure conditions.
	f. Push control panel back into frame. Use care to avoid breaking or kinking sensing line and the LPCO jumper.	
	g. Replace top cover	
	h. Connect power supply.	
	i. Remove jumper when outside temperature increases to 40° F (5°c)	

Section III. PREVENTIVE MAINTENANCE

Table 3-5. PREVENTIVE MAINTENANCE CHECKS AND SERVICES DAILY


FABRIC COVER
VENT CONTROL
ACCESS PANEL
AIR OUT
ALTERNATE CONNECTOR J1
CONTROL PANEL
AIR IN
FABRIC COVER
ALTERNATE CONNECTOR J11
SIGHT GLASS
AIR OUT
THERMOSTATIC SWITCH
FRESH AIR INTAKE
AIR IN

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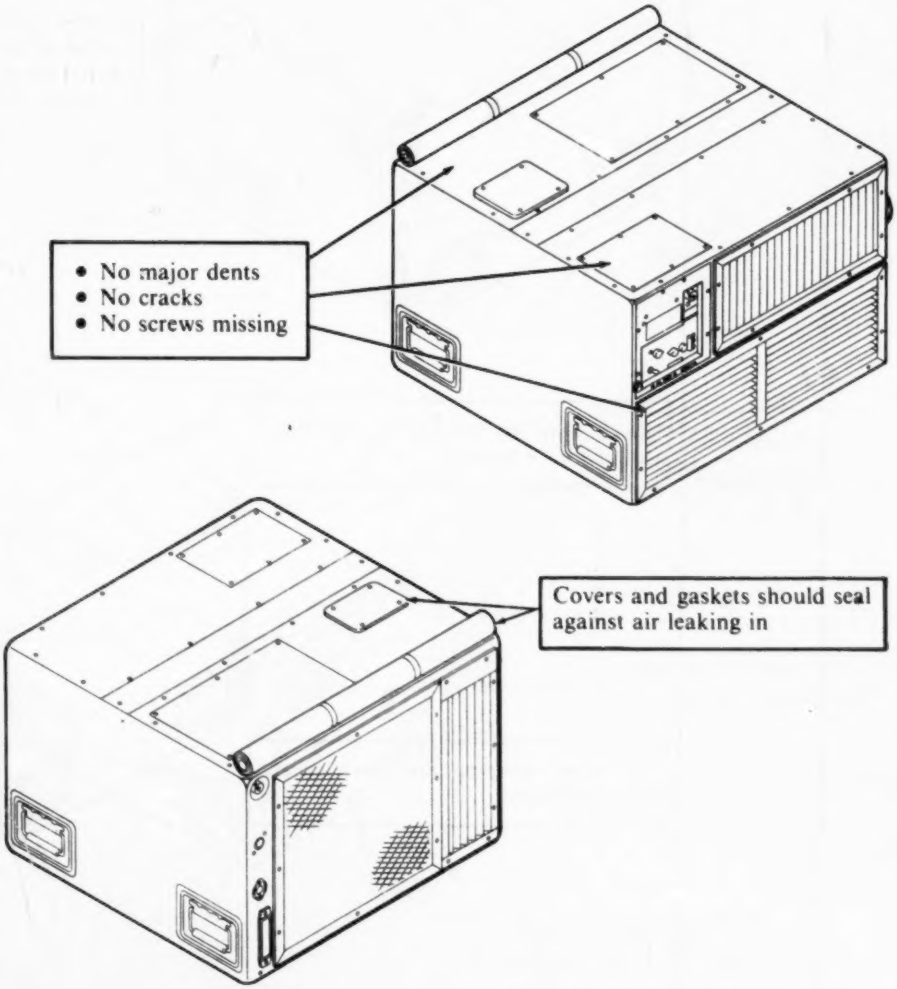
TM5-4120-367-14-89

Table 3-5. PREVENTIVE MAINTENANCE CHECKS AND SERVICES DAILY (CONTINUED)

Item No.	Item To Be Inspected	Procedures
1	All outside covers and information plates	**NOTE** All checks and services may be made while the air conditioner is on the shelter  • No major dents • No cracks • No screws missing Covers and gaskets should seal against air leaking in

A01342
TM5-4120-367-14-90

Table 3-5. PREVENTIVE MAINTENANCE CHECKS AND SERVICES DAILY (CONTINUED)

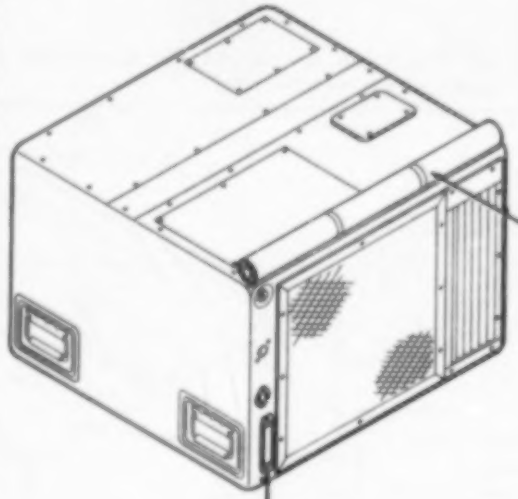
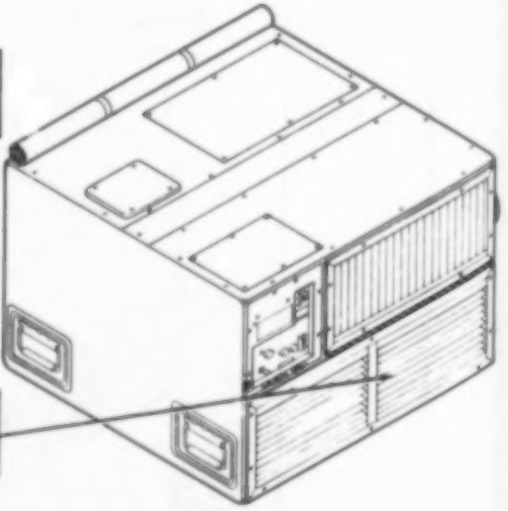
Item No.	Item To Be Inspected	Procedures
2	Condenser Cover	 • No mildew, tears or worn edges • All snaps in good condition
3	Condensate Drain	Check after air conditioner has been running for a while  No water dripping anywhere except through drain

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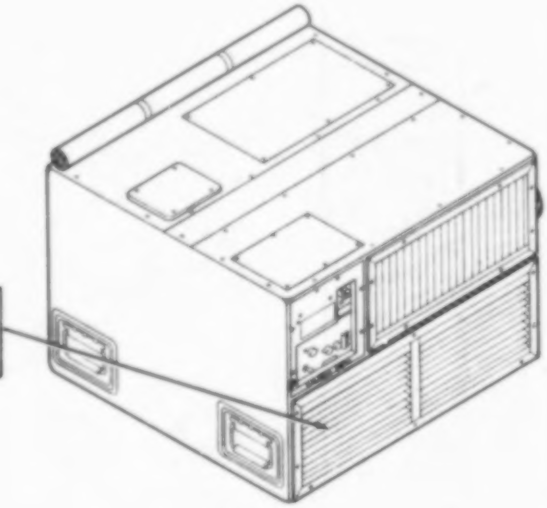
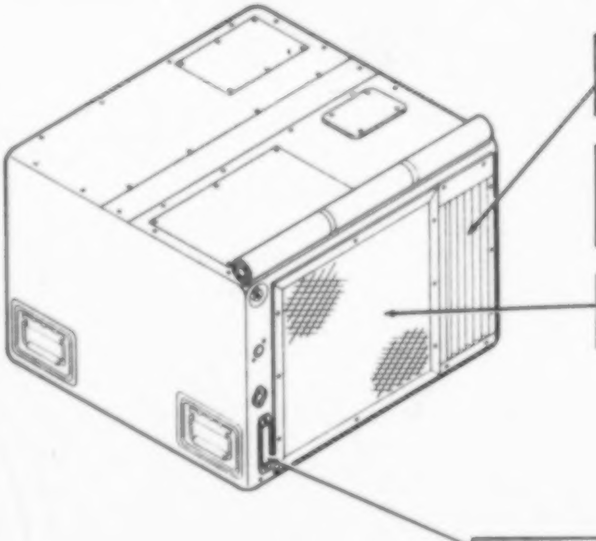
Table 3-5. PREVENTIVE MAINTENANCE CHECKS AND SERVICES DAILY (CONTINUED)

Item No.	Item To Be Inspected	Procedures
4	Return Air Intake	 • Air intake clear • Filter clean
5	Condenser Air Intake, Discharge and Fresh Air Filter	 • Air discharge clear • Guard not damaged • No source of fumes or heat within 10 feet of unit • Air intake clear • Guard not damaged • Filter not damaged

A01344
TM5-4120-367-14-92

Table 3-5. PREVENTIVE MAINTENANCE CHECKS AND SERVICES DAILY (CONTINUED)

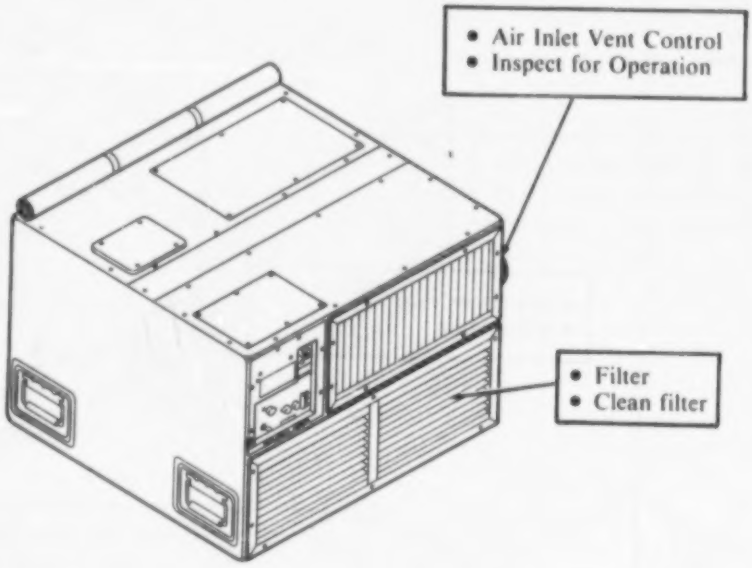
Item No.	Item To Be Inspected	Procedures
6	Return Air Filter and Air Inlet Vent Control	 • Air Inlet Vent Control • Inspect for Operation • Filter • Clean filter

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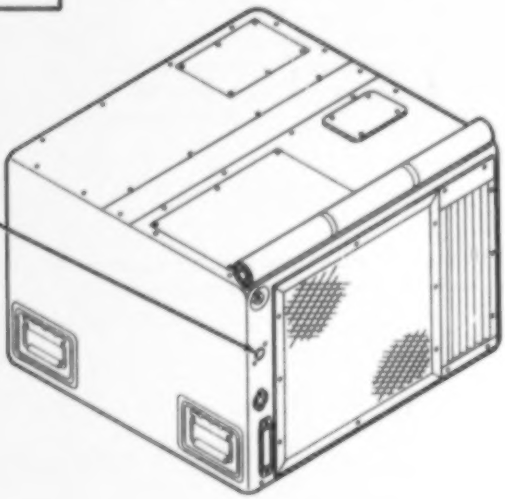
Table 3-5. PREVENTIVE MAINTENANCE CHECKS AND SERVICES DAILY (CONTINUED)

Item No.	Item To Be Inspected	Procedures
7	Sight Glass	Check after air conditioner has been running (cool mode) for 15 minutes Check Moisture Indicator Center should be clear with no bubbles • Green - no moisture • Chartreuse - moisture • Yellow - replace drier/ filter and refrigerant 

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End Chapter 3

CHAPTER 4

TROUBLESHOOTING

4-1. TROUBLESHOOTING

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the air conditioner.

NOTE

This is a combined troubleshooting covering Organizational, Direct and General Support Maintenance. Refer to the Maintenance Allocation Chart (MAC), Appendix D for tasks authorized to your level of maintenance.

b. Before using the troubleshooting guides, perform an operating check. If possible, isolate the problem to either equipment failure or control failure.

WARNING

Disconnect power from the air conditioner before doing any maintenance work to the electrical system. High voltage in air conditioner can kill you.

WARNING

Never work on this equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Be careful not to contact high voltage connections. Keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body. Do not be misled by term "low voltage". Potentials as low as 50 volts may cause death under adverse conditions.

NOTE

At outside temperatures below 0° F (-18° C) LPCO will have to be jumped to operate in COOL mode.

TABLE 4-1. OPERATIONAL STATUS

	Cool		Vent		Heat	
Component	**High**	**Low**	**High**	**Low**	**High**	**Low**
Compressor	On	On	Off	Off	Off	Off
Condenser Fan Motor	On HIGH or LOW	On HIGH or LOW	Off	Off	Off	Off
Evaporator Fan Motor	On HIGH	On LOW	On HIGH	On LOW	On HIGH	On LOW
*Solenoid Valve L1	On	On	Off	Off	Off	
*Solenoid Valve L2	On/Off	On/Off	Off	Off	Off	Off
Heaters 1st Stage	Off	Off	Off	Off	On	Off
Heaters 2nd Stage	Off	Off	Off	Off	On/Off	On/Off

*Solenoid valves are normally open. When unit is de-energized valves are open.

L1 would be open or de-energized during cooling.
L2 would be closed or energized during cooling.

TABLE 4-2. TROUBLESHOOTING SYMPTOM INDEX

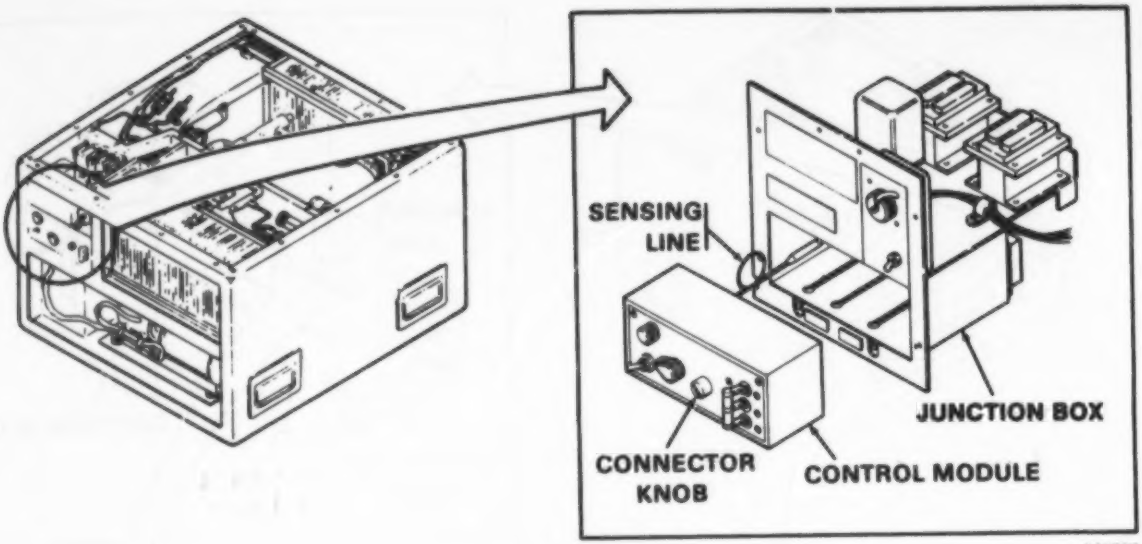
Primary Symptom	Secondary Symptoms/Conditions				Troubleshooting Procedures Paragraph
	Compressor	Evaporator Blower	Condenser Blower	Heaters	
Air Conditioner Fails To Start In Any Mode	X	X	X	X	4-2
Evaporator Blower Fails To Start	Starts	X	Starts	Heats	4-3
Compressor Fails to Start	X	Starts	X Starts	NA	4-4
Condenser Fan Fails to Start	Starts X	Starts	X	NA	4-5
Little Or No Cooling Action	Starts	Starts	Starts	NA	4-6
Cooling Action Stops After Operating For Short Time	X	X	X	NA	4-7
Little Or No Heating In Low Heat Mode	NA	Starts	NA	X Some Heat X No Heat	4-8
Little Or No Additional Heating In High Heat	NA	Starts	NA	X Some additional heat X No additional heat	4-9
Temperature Selector Effective	Starts	Starts	Starts		4-10
Unusual Noise Or Vibration	Starts	Starts	Starts	Starts	4-11
Unit Runs In COOL, But Discharge air is warm	Starts	Starts	Starts	NA	4-12
Frosted Evaporator Coil	Starts	Starts	Starts	NA	4-13
Excessive Head Pressure	Starts and Stops	Starts	Starts	NA	4-14
Low Head Pressure	Starts	Starts	Starts	NA	4-15
Excessive Suction Pressure	Starts	Starts	Starts	NA	4-16
Low Suction Pressure	Starts and Stops	Starts	Starts	NA	4-17

TABLE 4-3. ELECTRICAL COMPONENT TESTS

No.	Procedure
1.	**Circuit Breakers CB1 and CB2.** Check continuity of the two circuit breakers. Tag and disconnect leads from circuit breaker. Using a multimeter, check continuity of each pair of terminals. Replace defective circuit breaker. There is a double throw switch on circuit breaker CB1. See paragraphs 5-13 and 5-14.
2.	**Time delay relay K1.** Apply 28 volts DC terminals 2 and 5; positive to terminal 2 and negative to terminal 5. Check across terminals 2 and 3 to see that contact is made within 30 ± 3 seconds of energizing the coil. Replace defective relay. See paragraph 5-8.
3.	**Relay K2 and K3.** Test each relay in the same manner. Apply 28 volts DC to terminals X1 and X2; positive to X1, negative to X2. Check continuity of pairs: A1 - A2, B1 - B2, and C1 - C2. Replace defective relay. See paragraph 5-9.
4.	**Relay K4.** Relay K4 is a 11 pin continuous duty, three pole, double throw, 24 volt DC coil relay. When the coil is activated by thermostatic switch S7, contacts 1 - 3, 5 - 11, and 10 - 8 open, and terminals 1 -4, 5 - 6, and 10 - 7 close. See paragraph 5-7. **NOTE** Pins 5 - 6 and 5 - 11 are not used in single phase unit model F18H. Apply 28 volts DC to terminals 2 and 9; positive to terminal 2, negative to terminal 9. Check continuity. Terminals (contacts) 1 - 3, 5 - 11, 10 - 8 should be closed, 1 - 4, 5 - 6, 10 - 7 should be open. Remove the power terminals 1 - 4, 5 - 6, 10 - 7 should be closed, 1 - 3, 5 - 11, 10 - 8 should be open. Replace defective relay.
5.	**Transformer T1.** Apply 115 volts AC, 120 watts, to input terminals 1 and 2 (F18H, F18H-3 or F18H-4) or 2 and 5 (F18H-3A or F18H-4A). Voltage at output terminals 3 and 4 (F18H, F18H-3 or F18H-4) or 7 and 8 (F18H-3A or F18H-4A) should be 28 to 30 volts AC, 4 amps. Remove power from transformer. Replace defective transformer. See paragraph 5-6.
6.	**Rectifier CR1.** Apply 28-30 volts AC to rectifier terminals 1 and 3. Output at terminals 4 and 2 should be 26 to 30 volts DC. Terminal 4 is negative, 2 is positive. Replace faulty rectifier. See paragraph 5-5.
7.	**Mode selector switch S1.** Check continuity of selector switch in all positions. See table 4-4 or 4-5. See paragraph 5-10.
8.	**Temperature Selector S3.** Remove the return air louver and air filter. Carefully remove the sensing bulb from the clamped position. Place the sensor bulb in a container of warm water 85°F to 100°F (30° to 40°C). Turn knob from the extreme WARMER to extreme COOLER position. Continuity should be indicated. See paragraph 5-11. Place the sensor bulb in a container of cold water 40° to 65°F (5° to 18°C). Turn the knob from the extreme COOLER to the extreme WARMER position. Continuity should be indicated.
9.	**Fan Speed switch S2.** Check continuity in both positions. Continuity should be indicated. See paragraph 5-12.
10.	**Motors B2 and B3.** Disconnect power from the unit. Spin the fan/blower. Listen for bearing noise. If bearing noise is evident, turn shaft slowly backward and forward to check for roughness. Use multimeter and check that no continuity exists between each pin and motor frame. Replace defective motor. See paragraph 6-29.

TABLE 4-3. ELECTRICAL COMPONENTS TESTS (CONTINUED)

No.	Procedure
11.	**Relay K5.** (Single phase only). Apply 230 volts single phase, 60 hertz to terminals 1 and 5. Contact which is across 1 and 2 should open at voltage rise between 180 to 190 volts. Remove voltage. Contact should close upon voltage drop between 115 and 55 volts. Rating of relay is 5180 ohms. See paragraph 5-17.
12.	**Condenser fan switch S7.** Tape the bulb of a thermometer or junction of a thermocouple to the sensing part of the switch. Disconnect plug P7 and connect multimeter to the connector. Gradually apply heat and observe both the thermometer and multimeter. Contact shall be open until temperature reaches 100°F (38°C) and above, at which time contact should close. Allow temperature to drop. Contact should open at below 100°F (38°C). Remove meter and connect plug. See paragraph 5-26.
13.	**Heater Thermostat S6.** Visually inspect the heater thermostat for cracks in the housing, missing pieces or other damage. Replace. See paragraph 5-27.
	a. Using a multimeter check continuity of the wire leads attached to terminals 1 and 2, 3 and 4 of the heater thermostat. Continuity should be indicated.
	b. Tape the bulb of a thermometer or junction of a thermocouple to the body of the heater thermostat, and leave the continuity tester connected to terminals one and two. Gradually apply heat, and observe both the thermometer and the continuity tester. Continuity should drop out at 194° ± 9°F (90° ± 5°C). While still continuing to watch the thermometer and the continuity tester, let the heater thermostat cool. Continuity should be re-established at 142° ± 17° F (61° ± 9°C).
	c. Repeat step b with the meter connected to terminal 3 and 4.
	d. If the heater thermostat does not meet temperature and continuity requirements, replace it.
14.	**Heater HR1 thru HR6.** The six steel sheathed resistance heating elements are located immediately behind the evaporator coil, and extend all the way across the width of the evaporator. Three of the elements are energized when the selector switch is set at LOW HEAT, and all six elements are energized when the selector switch is set at HIGH HEAT. The temperature control thermostat controls only the elements energized by the LOW HEAT setting. All six elements are protected against overheating by a thermal overload protector (heater thermostat). See paragraph 5-28.
	WARNING **Hot heaters can cause severe burns.**
	a. Visually inspect each heating element from damage, deformation, damaged terminal threads, cracked or broken sheath, or burnt-out spots.
	b. If damaged, replace.
	c. Using an ohmmeter, multimeter or other continuity tester, check continuity of each heating element. Replace elements that do not indicate continuity.


SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE

A01289
TM5-4120-367-14-7

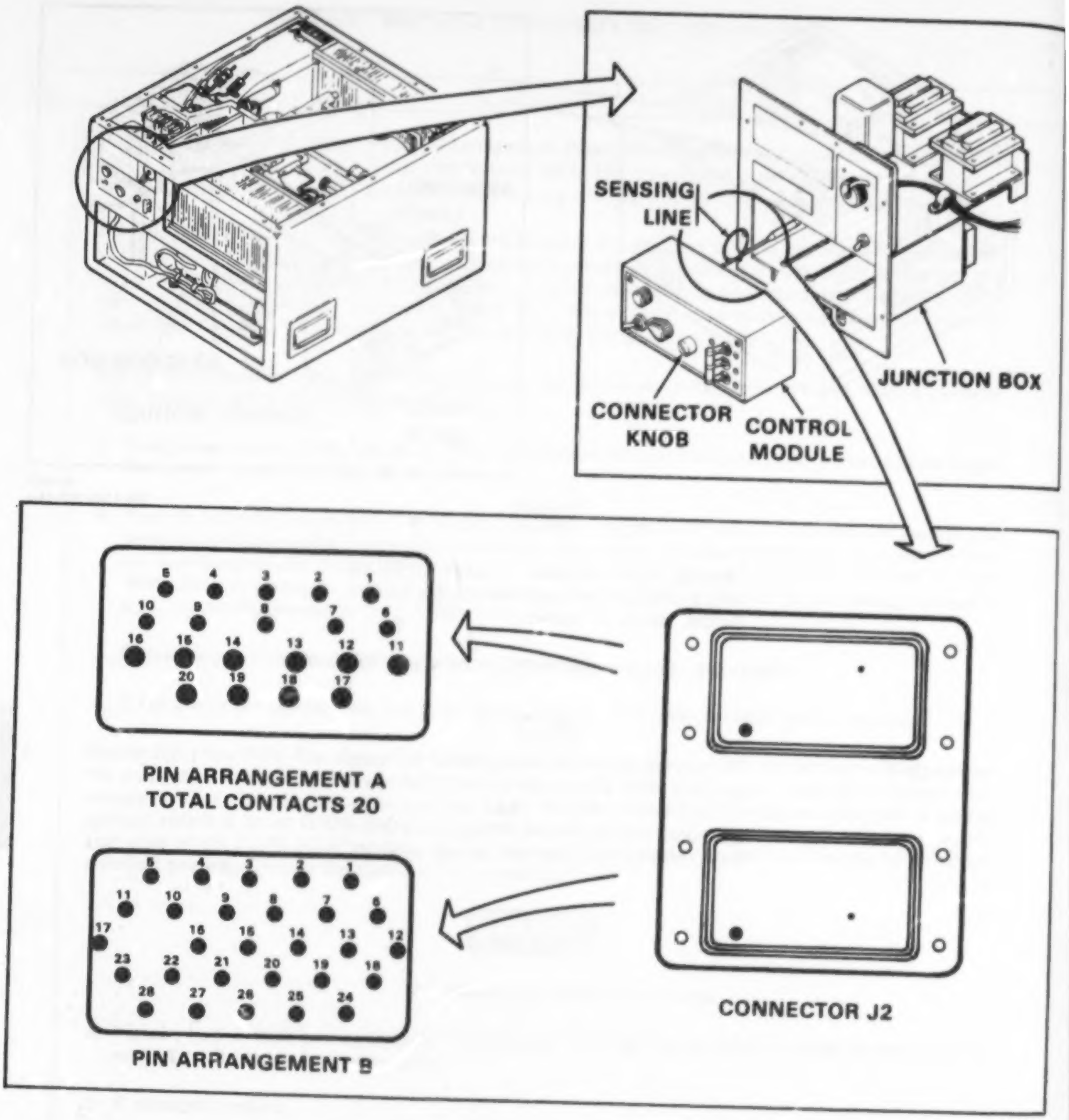
NOTE

Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is located behind return air louver.

Figure 4-1. Junction Box and Control Panel Removal

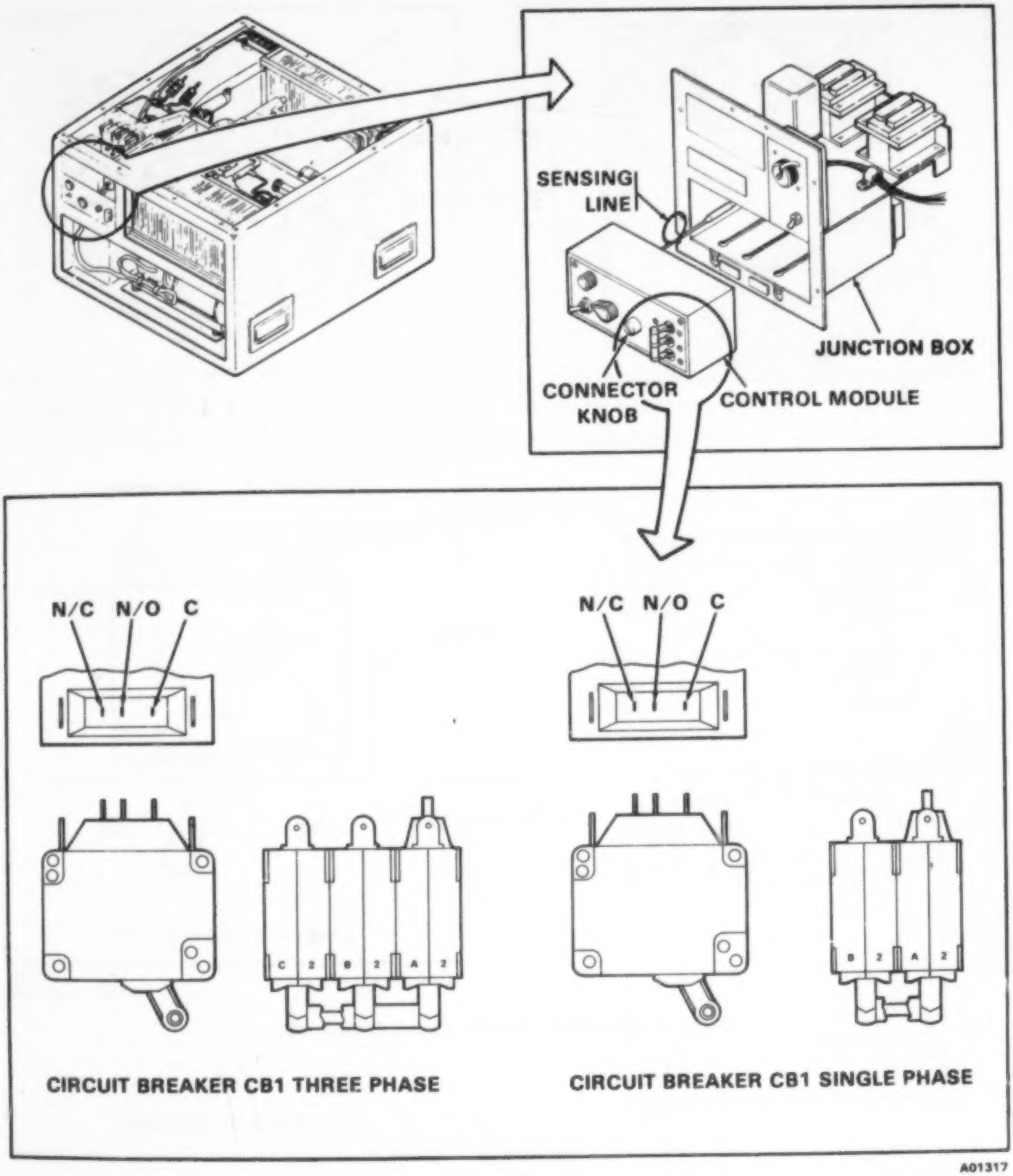
NOTE

The connector knob was supplied on units prior to 1983. This knob is not supplied on F18H-3A or F18H-4A units and is not required on existing F18H, F18H-3 or F18H-4 units. Use screw driver slot in end of shaft.


SENSING LINE
CONNECTOR KNOB
CONTROL MODULE
JUNCTION BOX
5
4
3
2
1
10
9
8
7
6
16
15
14
13
12
11
20
19
18
17
PIN ARRANGEMENT A
TOTAL CONTACTS 20
5
4
3
2
1
11
10
9
8
7
6
17
16
15
14
13
12
23
22
21
20
19
18
28
27
26
25
24
PIN ARRANGEMENT B
CONNECTOR J2

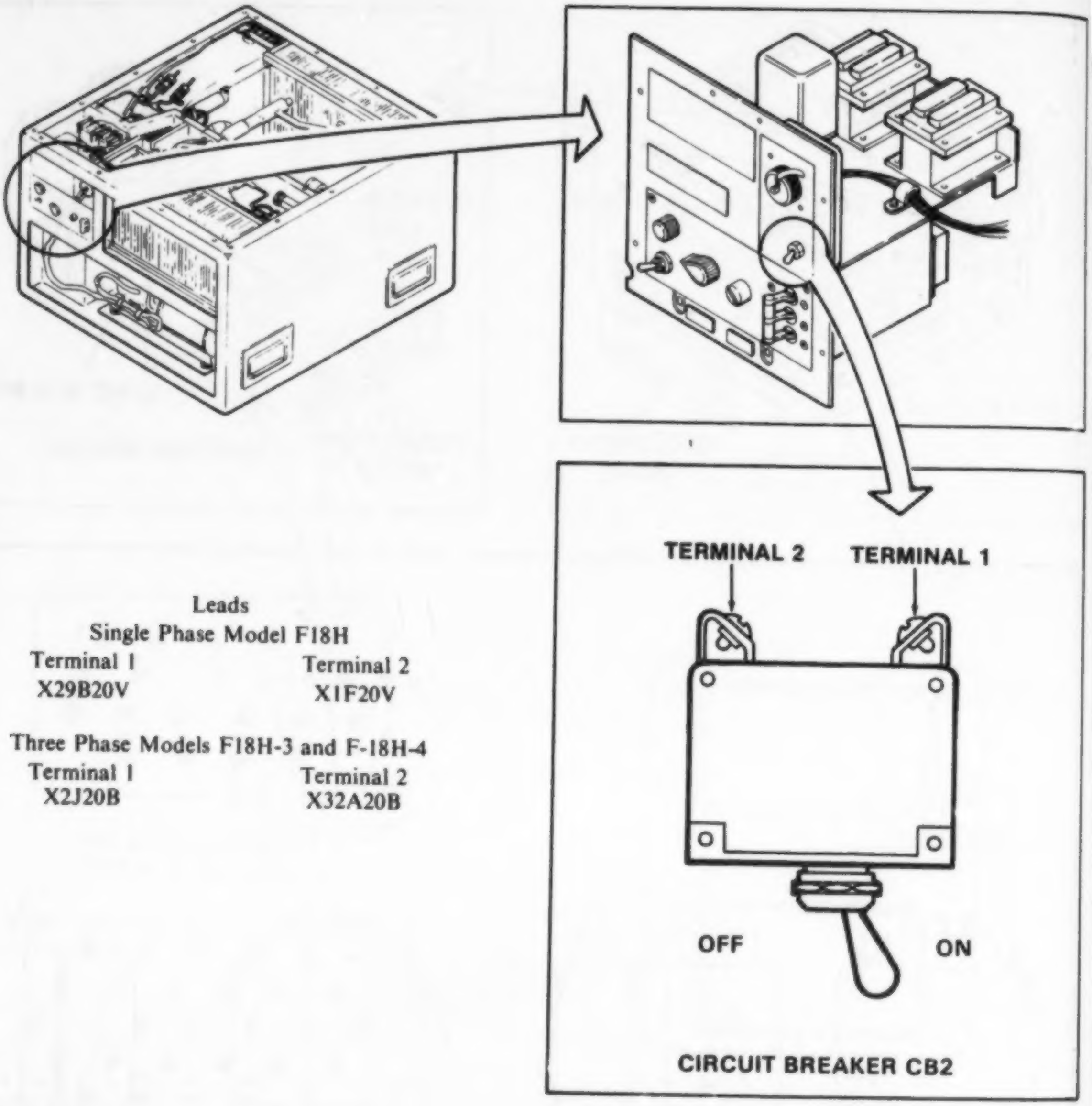
A01316
TM5-4120-367-14-64

Figure 4-2. Terminal Location, Connector J2


SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE
N/C N/O C
C 2 B 2 A 2
CIRCUIT BREAKER CB1 THREE PHASE
N/C N/O C
B 2 A 2
CIRCUIT BREAKER CB1 SINGLE PHASE

A01317
TM5-4120-367-14-65

Figure 4-3. Terminal Location, Circuit Breaker CB1


TERMINAL 2
TERMINAL 1
OFF
ON
CIRCUIT BREAKER CB2

Leads

Single Phase Model F18H

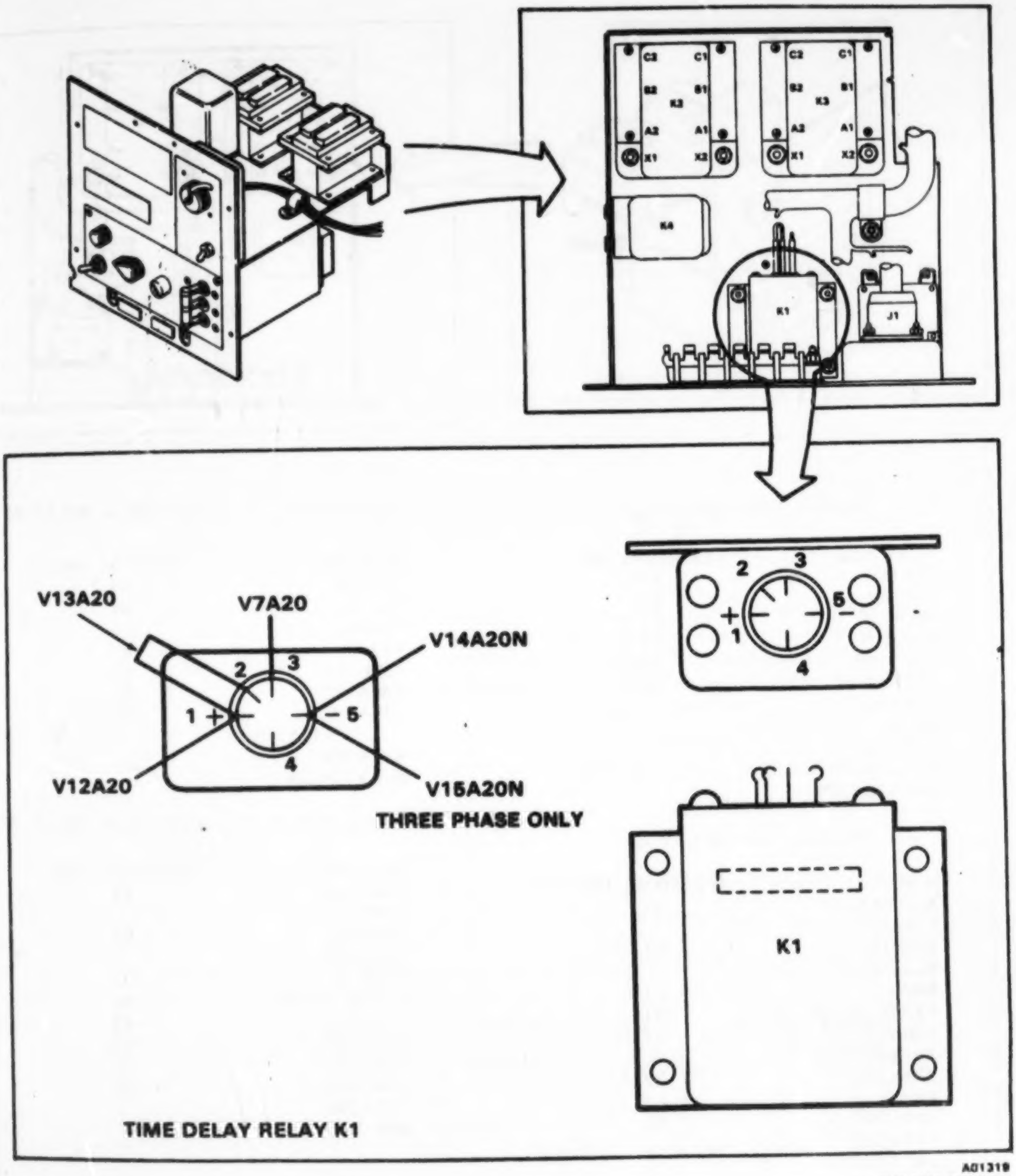
Terminal 1	Terminal 2
X29B20V	X1F20V

Three Phase Models F18H-3 and F-18H-4

Terminal 1	Terminal 2
X2J20B	X32A20B

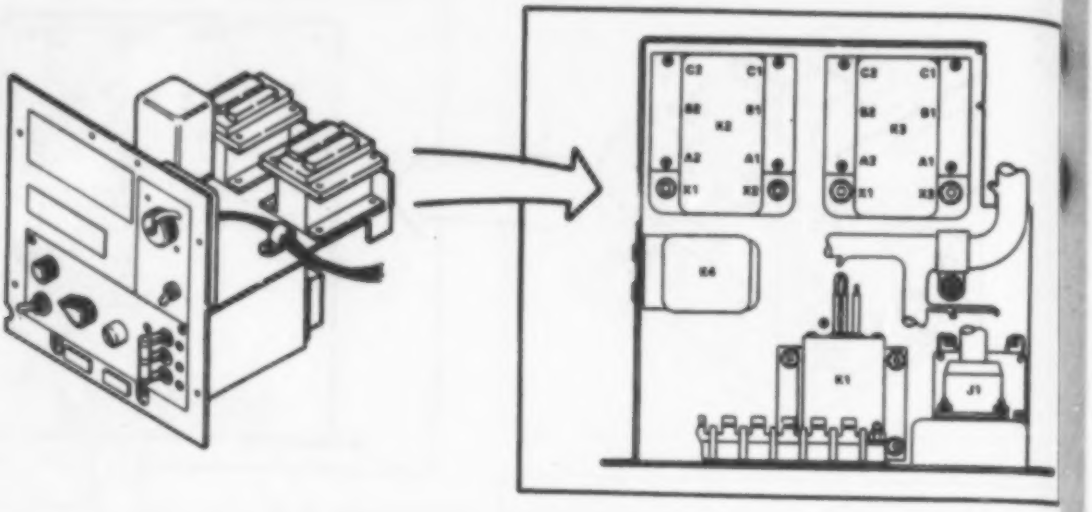
A01318
TM5-4120-367-14-86

Figure 4-4. Terminal Location, Circuit Breaker CB2


C2
C1
B2
B1
K2
A2
A1
X1
X2
C2
C1
B2
B1
K3
A2
A1
X1
X2
K4
K1
J1
V13A20
V7A20
V14A20N
2
3
1 +
− 5
4
V12A20
V15A20N
THREE PHASE ONLY
2
3
+
1
5
−
4
K1
TIME DELAY RELAY K1

A01319
TM5-4120-367-14-67

Figure 4-5. Terminal Location, Relay K1



MODEL F18H RELAY K2

WIRE NO.	TERMINAL NO.
X1E16V	A1
X2E16V	B1
Blank	C1
V3A20	X1
X32A16V	A2
X17B16V, X31A16V	B2
Blank	C2
V15A20N, V17A20N and V16A20N	X2

MODELS FI8H-3 & KIF-18H-4 RELAY K2

WIRE NO.	TEMINAL NO.
X1E16A	A1
X2J20B, X2E16B	B1
X3E16C	C1
V3A20	X1
X39A16A	A2
X60A16B	B2
X59A16C	C2
V15A20N, V16A20N and V17A20N	X2

MODEL F18H RELAY K3

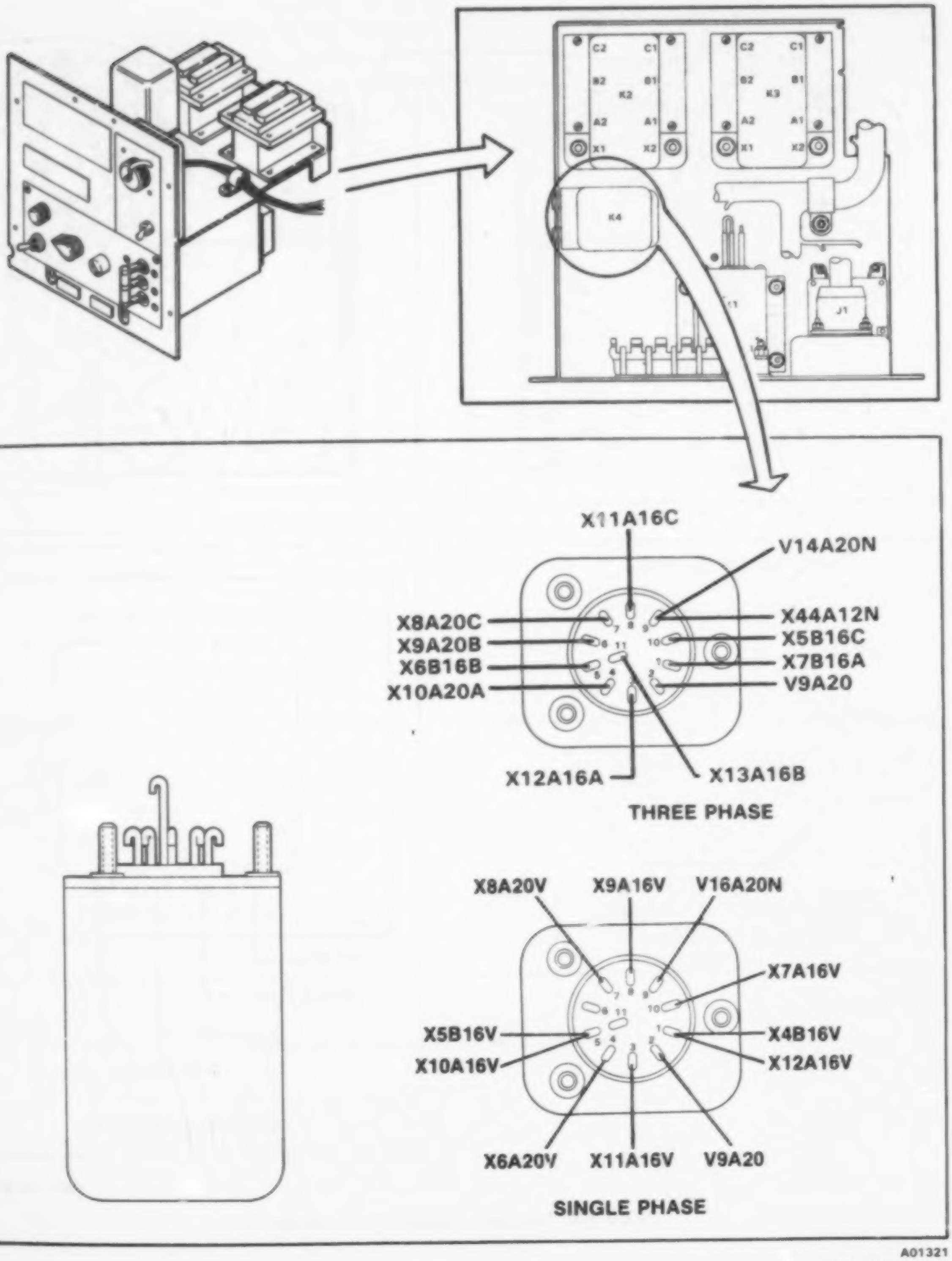
WIRE NO.	TERMINAL NO.
X19C16X, X19B12V	A1
X23B12V, X23C16Y	B1
Blank	C1
V8A20, V7A20	X1
X20A12V, X21A12V	A2
X24A12V	B2
Blank	C2
V10A20N, V17A20N, and X18A20N	X2

MODELS FI8H-3 & KIF-18H-4 RELAY K2

WIRE NO.	TERMINAL NO.
X20C16B, X20B12A	A1
X22B12B, X22C16B	B1
X24B12C	C1
V7A20, V8A20	X1
X21A12A	A2
X23A12B	B2
X25A12C	C2
V10A20N, V17A20N and V18A20N.	X2

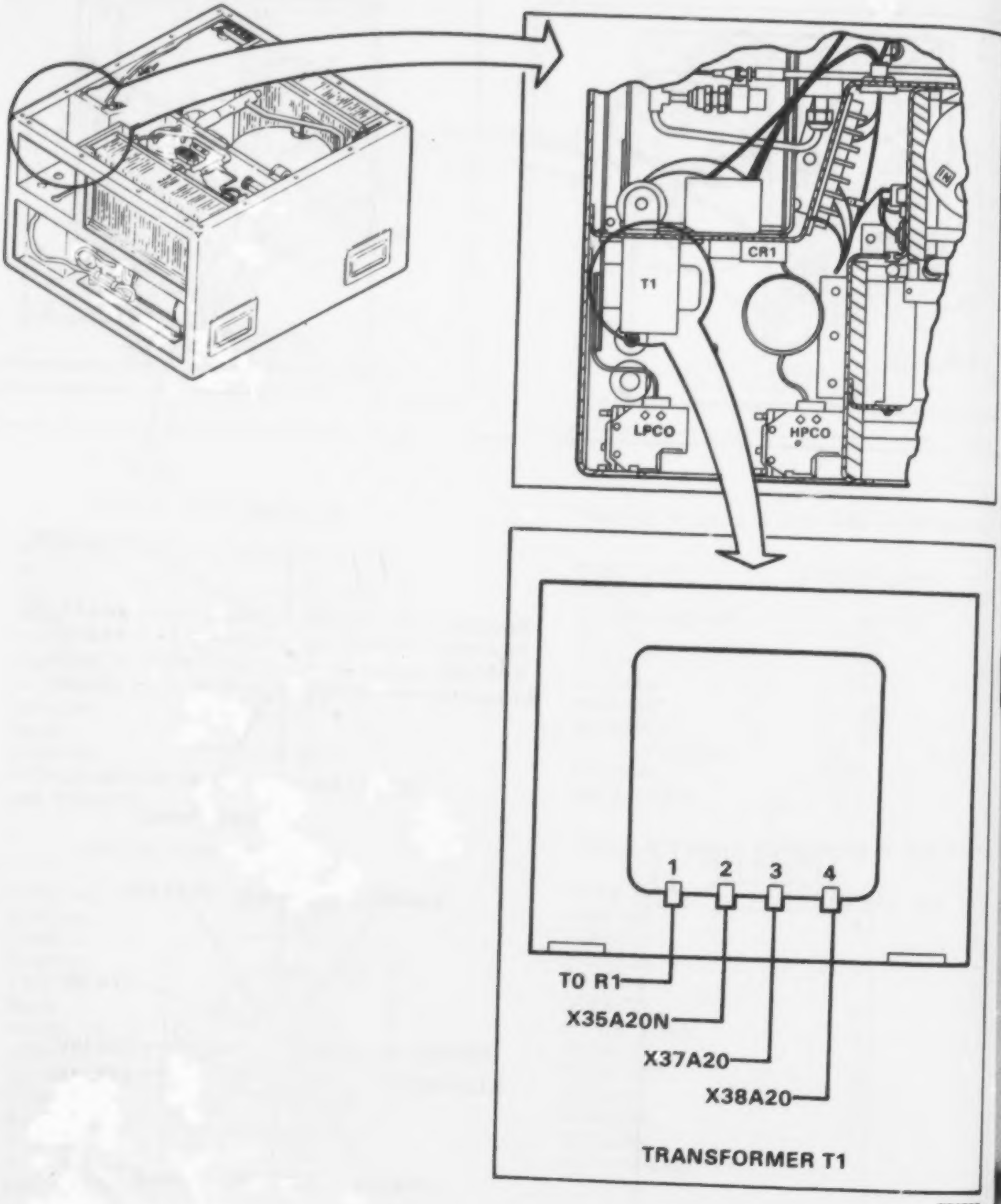
A0157
TM5-4120-367-14-6

Figure 4-6. Terminal Location, Relay K2 and K3


C2
C1
B2
B1
K2
A2
A1
X1
X2
C2
C1
B2
B1
K3
A2
A1
X1
X2
K4
K1
J1
X11A16C
V14A20N
X8A20C
X44A12N
X9A20B
X5B16C
X6B16B
X7B16A
X10A20A
V9A20
X12A16A
X13A16B
THREE PHASE
X8A20V
X9A16V
V16A20N
X7A16V
X5B16V
X4B16V
X10A16V
X12A16V
X6A20V
X11A16V
V9A20
SINGLE PHASE

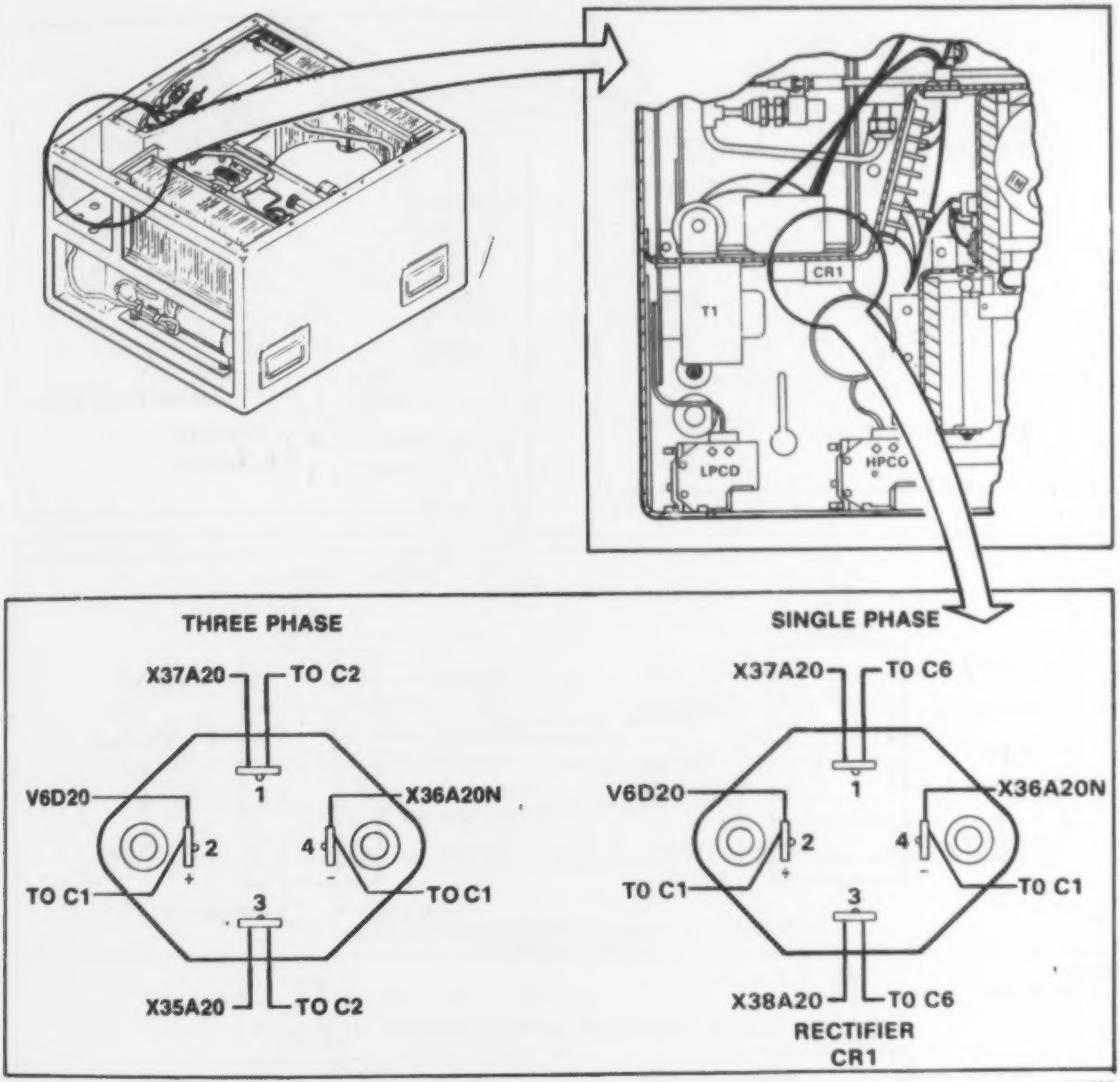
A01321
TM5-4120-367-14-69

Figure 4-7. Terminal Location, Relay K4


T1
CR1
LPCO
HPCO
1
2
3
4
TO R1
X35A20N
X37A20
X38A20
TRANSFORMER T1

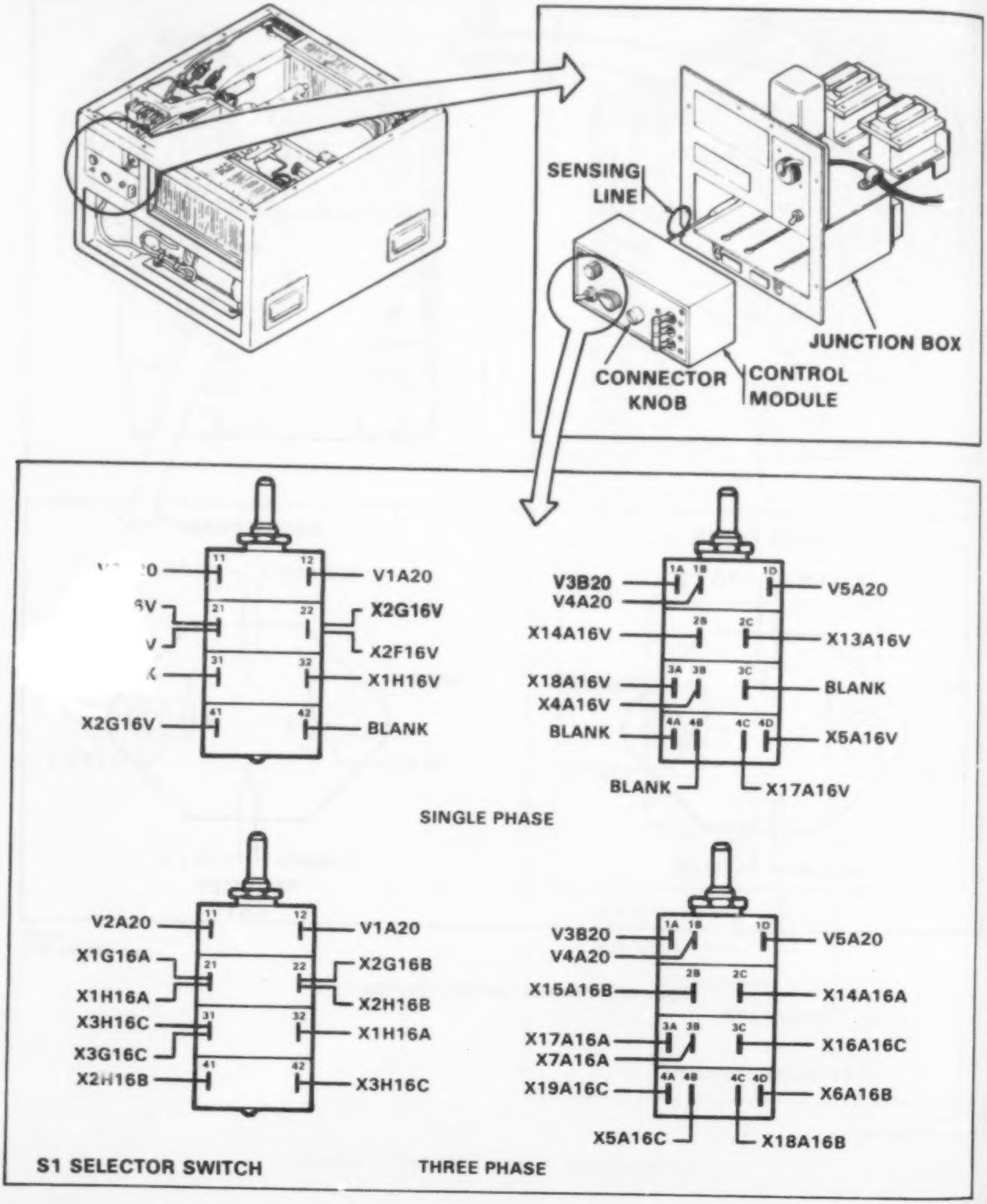
A01322
TM5-4120-367-14-70

Figure 4-8. Terminal Location, Transformer T1


CR1
T1
LPCD
HPCO
THREE PHASE
X37A20
TO C2
V6D20
1
X36A20N
2
4
+
-
TO C1
TO C1
3
X35A20
TO C2
SINGLE PHASE
X37A20
TO C6
V6D20
1
X36A20N
2
4
+
-
TO C1
TO C1
3
X38A20
TO C6
RECTIFIER
CR1

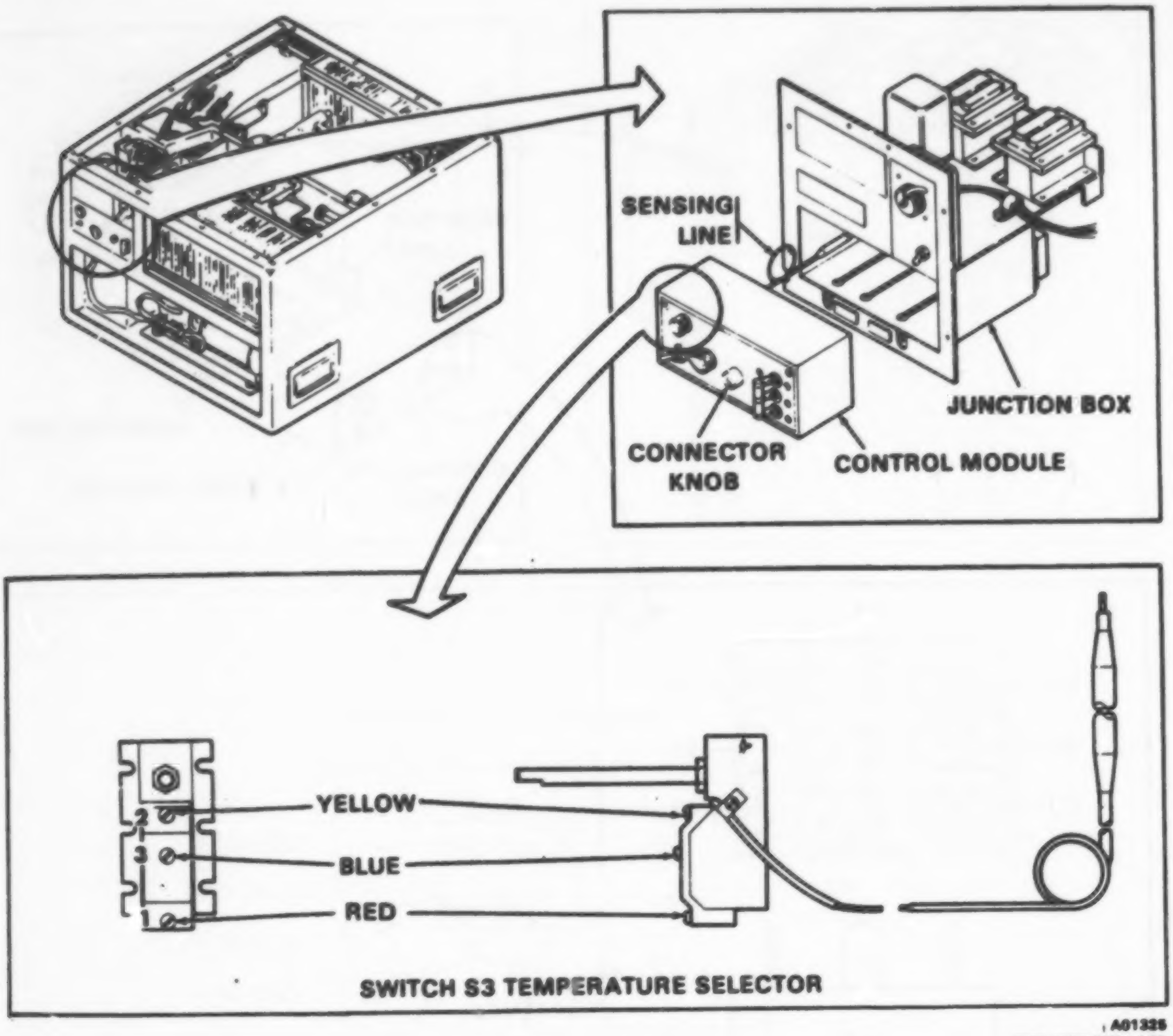
A01323
TM5-4120-367-14-71

Figure 4-9. Terminal Location, Rectifier CR1


SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE
11
12
V1A20
21
22
X2G16V
X2F16V
31
32
X1H16V
X2G16V
41
42
BLANK
V3B20
V4A20
1A 1B
1D
V5A20
X14A16V
2B
2C
X13A16V
X18A16V
X4A16V
3A 3B
3C
BLANK
BLANK
4A 4B
4C 4D
X5A16V
BLANK
X17A16V
SINGLE PHASE
V2A20
11
12
V1A20
X1G16A
21
22
X2G16B
X1H16A
X2H16B
X3H16C
31
32
X1H16A
X3G16C
X2H16B
41
42
X3H16C
V3B20
V4A20
1A 1B
1D
V5A20
X15A16B
2B
2C
X14A16A
X17A16A
X7A16A
3A 3B
3C
X16A16C
X19A16C
4A 4B
4C 4D
X6A16B
X5A16C
X18A16B
S1 SELECTOR SWITCH
THREE PHASE

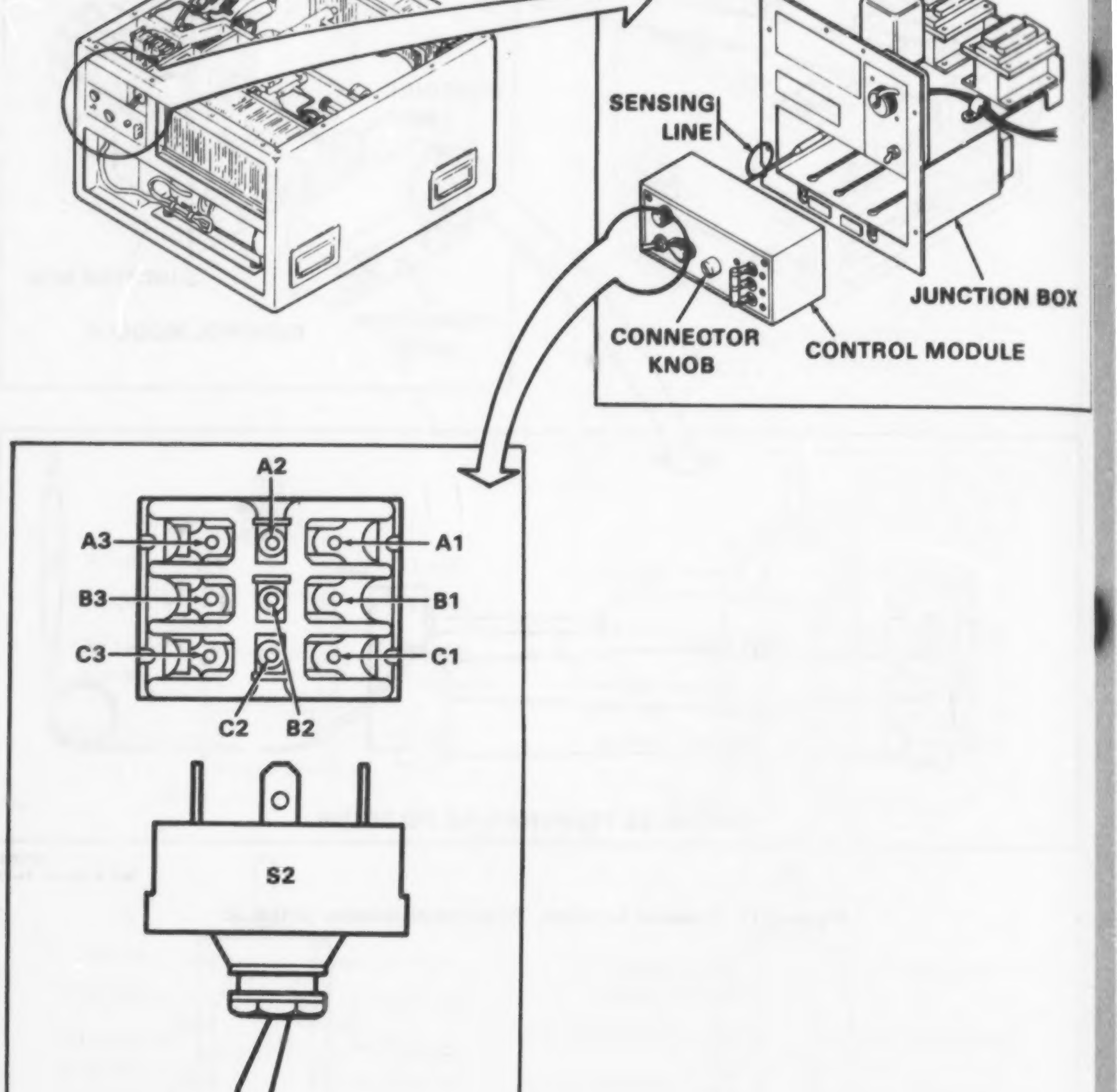
A01324
TM5-4120-367-14-72

Figure 4-10. Terminal Location, Mode Selector Switch S1


SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE
2
3
1
YELLOW
BLUE
RED
SWITCH S3 TEMPERATURE SELECTOR

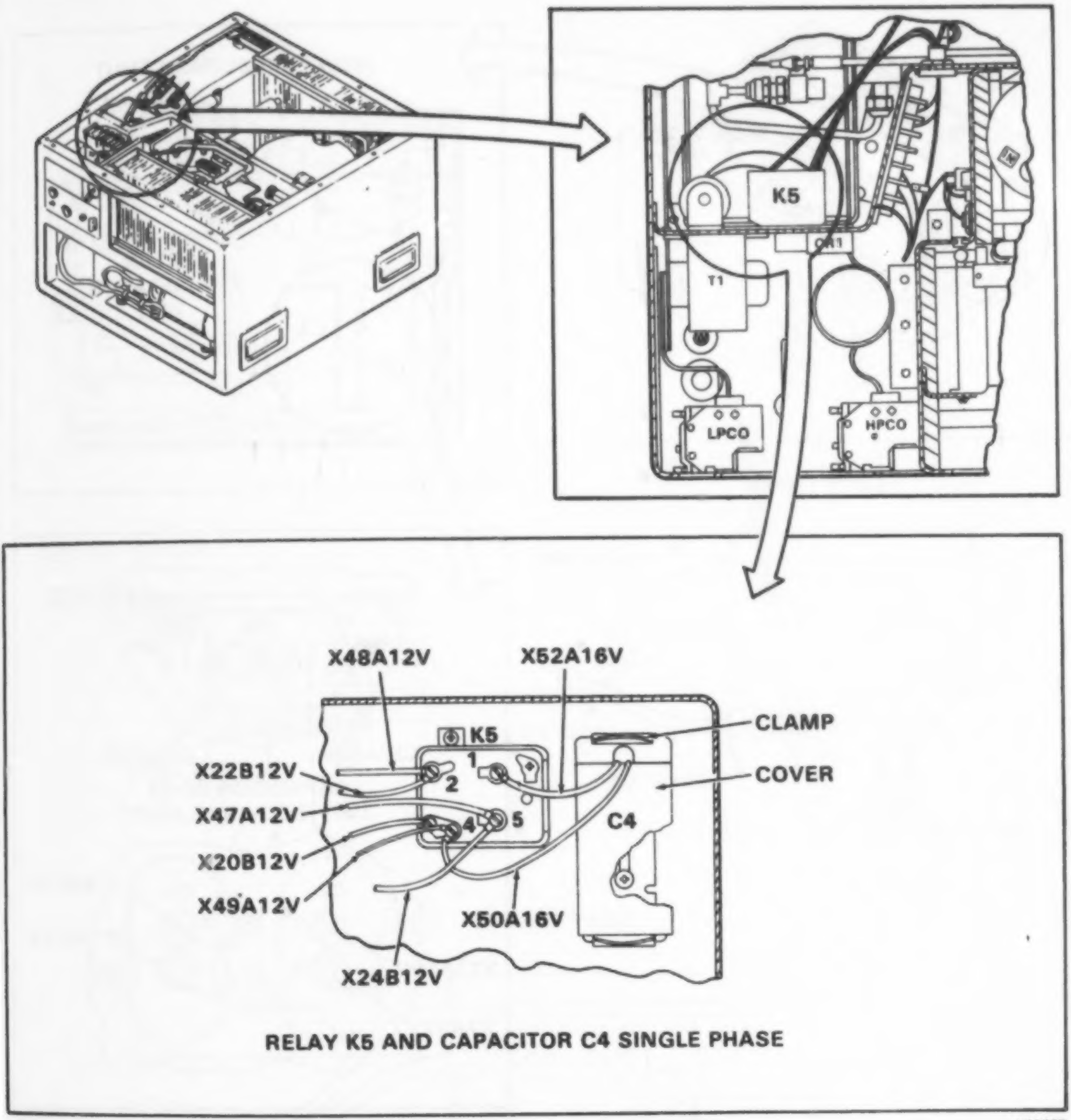
A01325
TM5-4120-367-14-73

Figure 4-11. Terminal Location, Temperature Selector Switch S3


SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE
A2
A3
A1
B3
B1
C3
C1
C2
B2
S2
SWITCH S2 FAN SPEED

A01320
TM5-4120-367-14-7

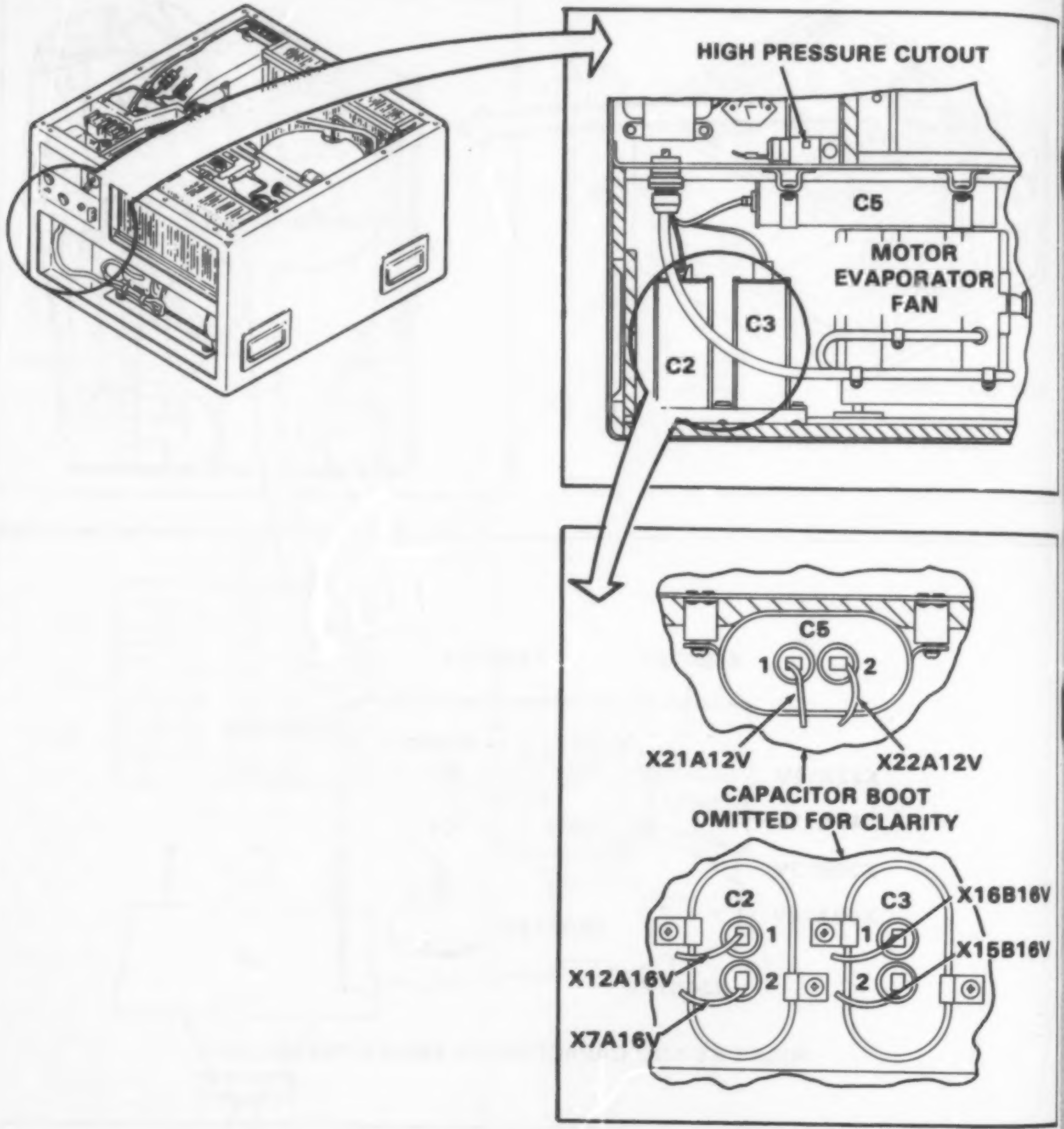
Figure 4-12. Terminal Location, Fan Speed Switch S2


K5
CR1
T1
LPCO
HPCO
X48A12V
X52A16V
K5
1
2
4
5
CLAMP
COVER
C4
X22B12V
X47A12V
X20B12V
X49A12V
X50A16V
X24B12V

RELAY K5 AND CAPACITOR C4 SINGLE PHASE

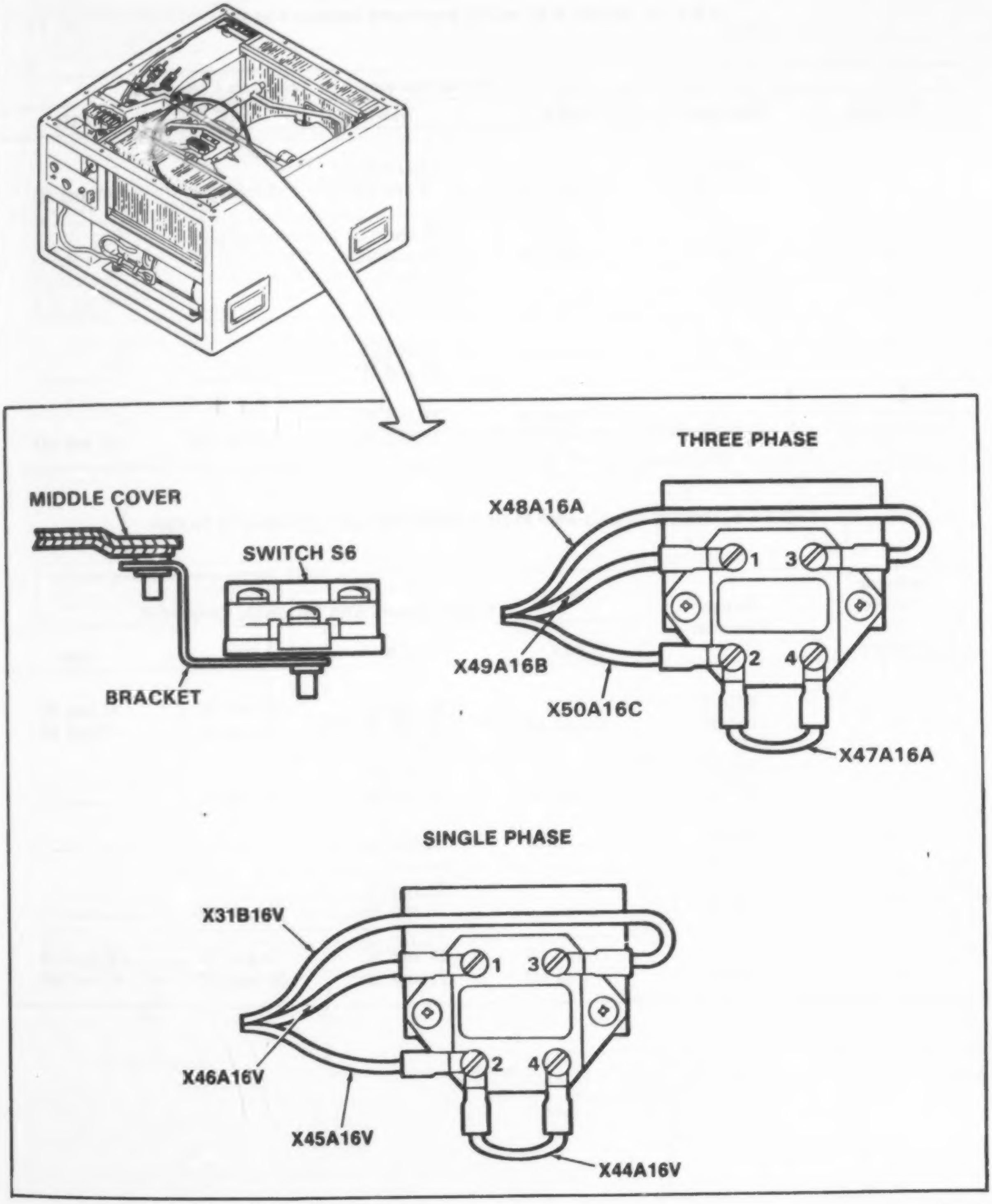
A01327
TM5-4120-367-14-78

Figure 4-13. Terminal Location, Relay K5 and Capacitor C4 (Single Phase)


HIGH PRESSURE CUTOUT
C5
MOTOR
EVAPORATOR
FAN
C3
C2
C5
1
2
X21A12V
X22A12V
CAPACITOR BOOT
OMITTED FOR CLARITY
C2
C3
X16B16V
1
1
X15B16V
X12A16V
2
2
X7A16V

A0132
TM5-4120-367-14-7

Figure 4-14. Terminal Location, Capacitors C2, C3, and C5 (Single Phase)


THREE PHASE
MIDDLE COVER
X48A16A
SWITCH S6
1
3
2
4
X49A16B
BRACKET
X50A16C
X47A16A
SINGLE PHASE
X31B16V
1
3
2
4
X46A16V
X45A16V
X44A16V

A01329
TM5-4120-367-14-77

Figure 4-15. Terminal Location, Heater Thermostat S6 (Overheat Safety)

TABLE 4-4. MODEL F18H MODE POSITIONS (SINGLE PHASE)

Position	Function	Switch Sections And Terminals Connected			
		S1A	S1B	S1C	S1D
1	Heat (HIGH)	12 and 1A	21 and 2C 22 and 2B	32 and 3A	41 and 4C
2	Heat (LOW)	12 and 1A	21 and 2C 22 and 2B	———	———
3	OFF	———	———	———	———
4	VENT	———	21 and 2C 22 and 2B	———	———
5	COOL	12 and 1B 11 and 1D	21 and 2C 22 and 2B	32 and 3B	41 and 4D

TABLE 4-5. MODELS F18H-3 AND F18H-4 MODE SWITCH POSITIONS (3 PHASE)

Selector Switch - S1 - Position	Switch Function	Switch Wafers And Terminals Connected			
		S1A	S1B	S1C	S1D
1	HEAT (HIGH)	12 and 1A	21 and 2C 22 and 2B	31 and 3C 32 and 3A	41 and 4C 42 and 4A
2	HEAT (LOW)	12 and 1A	21 and 2C 22 and 2B	31 and 3C	———
3	OFF	———	———	———	———
4	VENT	———	21 and 2C 22 and 2B	31 and 3C	———
5	COOL	12 and 1B 11 and 1D	21 and 2C 22 and 2B	32 and 3B 31 and 3C	42 and 4B 41 and 4D

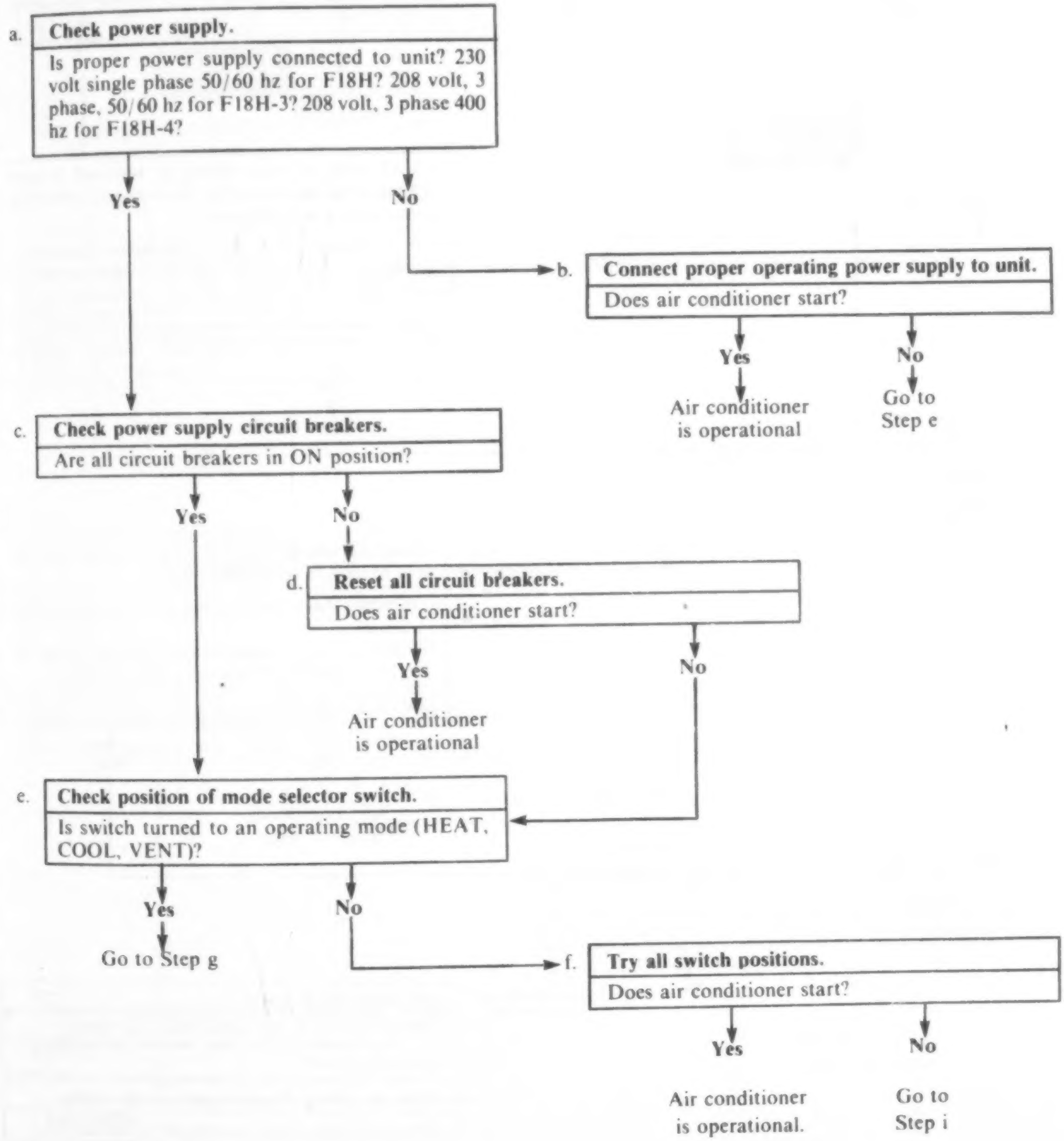
4-2. AIR CONDITIONER FAILS TO START IN ANY MODE

WARNING

High voltage in air conditioner can kill you.

NOTE

Evaporator blower will operate in one speed without the control circuit.



a. **Check power supply.**

Is proper power supply connected to unit? 230 volt single phase 50/60 hz for F18H? 208 volt, 3 phase, 50/60 hz for F18H-3? 208 volt, 3 phase 400 hz for F18H-4?

Yes → c. No → b.

b. **Connect proper operating power supply to unit.**

Does air conditioner start?

Yes → Air conditioner is operational. No → Go to Step e

c. **Check power supply circuit breakers.**

Are all circuit breakers in ON position?

Yes → e. No → d.

d. **Reset all circuit breakers.**

Does air conditioner start?

Yes → Air conditioner is operational. No → e.

e. **Check position of mode selector switch.**

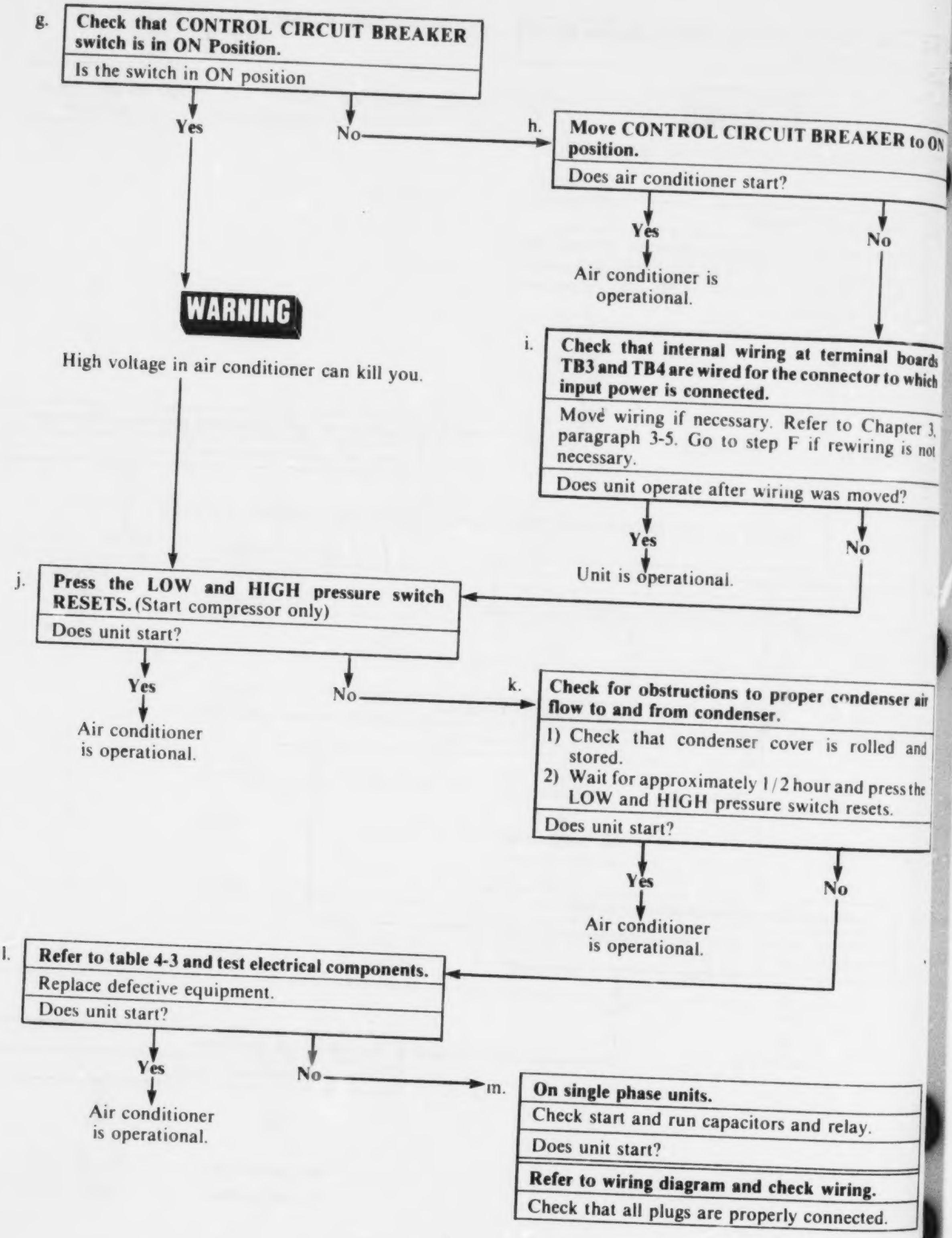
Is switch turned to an operating mode (HEAT, COOL, VENT)?

Yes → Go to Step g. No → f.

f. **Try all switch positions.**

Does air conditioner start?

Yes → Air conditioner is operational. No → Go to Step i



g. **Check that CONTROL CIRCUIT BREAKER switch is in ON Position.**

Is the switch in ON position

Yes / No

h. **Move CONTROL CIRCUIT BREAKER to ON position.**

Does air conditioner start?

Yes — Air conditioner is operational.

No

WARNING

High voltage in air conditioner can kill you.

i. **Check that internal wiring at terminal boards TB3 and TB4 are wired for the connector to which input power is connected.**

Movė wiring if necessary. Refer to Chapter 3, paragraph 3-5. Go to step F if rewiring is not necessary.

Does unit operate after wiring was moved?

Yes — Unit is operational.

No

j. **Press the LOW and HIGH pressure switch RESETS.** (Start compressor only)

Does unit start?

Yes — Air conditioner is operational.

No

k. **Check for obstructions to proper condenser air flow to and from condenser.**

1) Check that condenser cover is rolled and stored.
2) Wait for approximately 1/2 hour and press the LOW and HIGH pressure switch resets.

Does unit start?

Yes — Air conditioner is operational.

No

l. **Refer to table 4-3 and test electrical components.**

Replace defective equipment.

Does unit start?

Yes — Air conditioner is operational.

No

m. **On single phase units.**

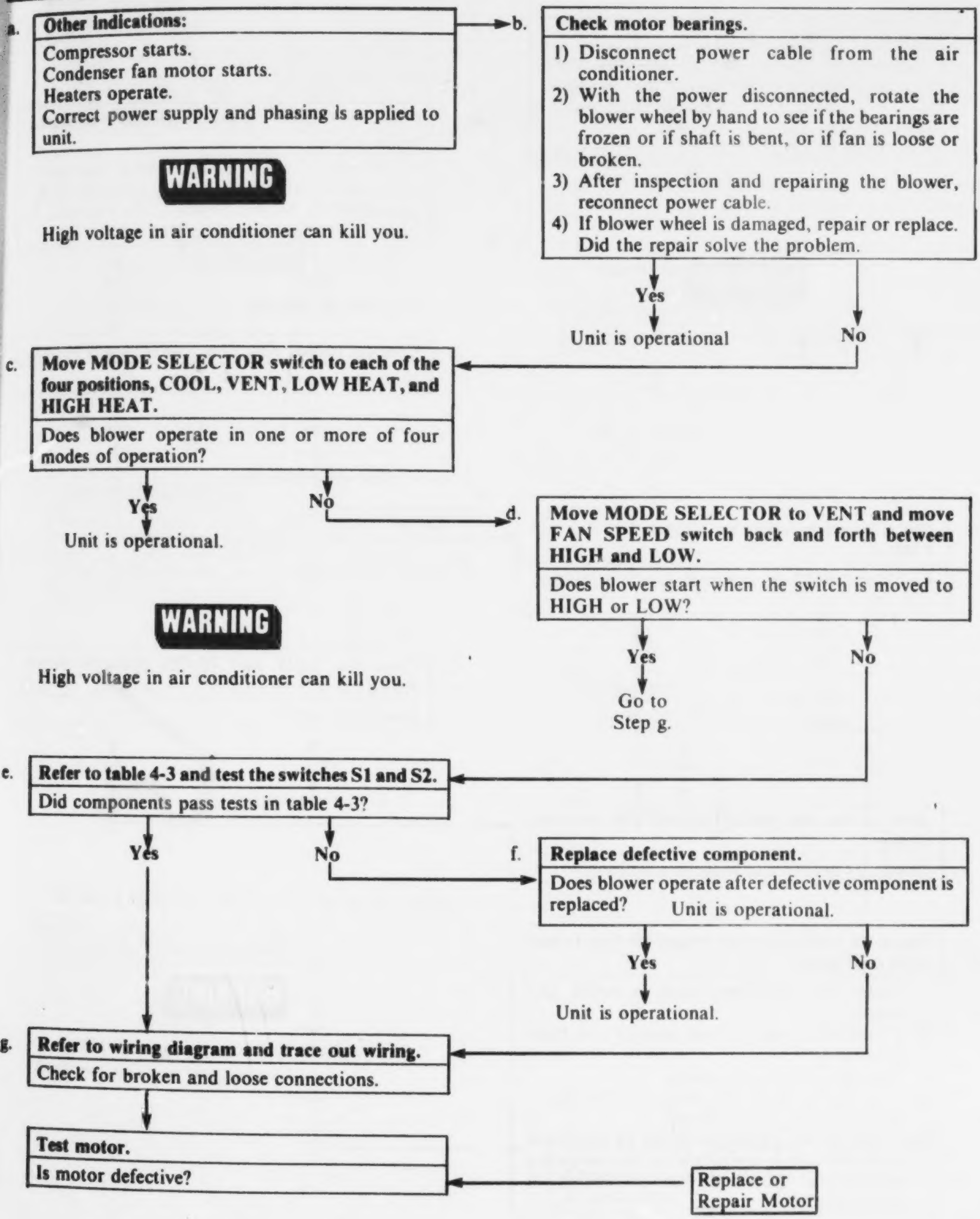
Check start and run capacitors and relay.

Does unit start?

Refer to wiring diagram and check wiring.

Check that all plugs are properly connected.

4-3. EVAPORATOR BLOWER FAILS TO START



a. **Other indications:**

Compressor starts.
Condenser fan motor starts.
Heaters operate.
Correct power supply and phasing is applied to unit.

WARNING

High voltage in air conditioner can kill you.

b. **Check motor bearings.**

1) Disconnect power cable from the air conditioner.
2) With the power disconnected, rotate the blower wheel by hand to see if the bearings are frozen or if shaft is bent, or if fan is loose or broken.
3) After inspection and repairing the blower, reconnect power cable.
4) If blower wheel is damaged, repair or replace. Did the repair solve the problem.

Yes — Unit is operational

No — go to c.

c. **Move MODE SELECTOR switch to each of the four positions, COOL, VENT, LOW HEAT, and HIGH HEAT.**

Does blower operate in one or more of four modes of operation?

Yes — Unit is operational.

No — go to d.

d. **Move MODE SELECTOR to VENT and move FAN SPEED switch back and forth between HIGH and LOW.**

Does blower start when the switch is moved to HIGH or LOW?

Yes — Go to Step g.

No — go to e.

WARNING

High voltage in air conditioner can kill you.

e. **Refer to table 4-3 and test the switches S1 and S2.**

Did components pass tests in table 4-3?

Yes — go to g.

No — go to f.

f. **Replace defective component.**

Does blower operate after defective component is replaced? Unit is operational.

Yes — Unit is operational.

No — go to g.

g. **Refer to wiring diagram and trace out wiring.**

Check for broken and loose connections.

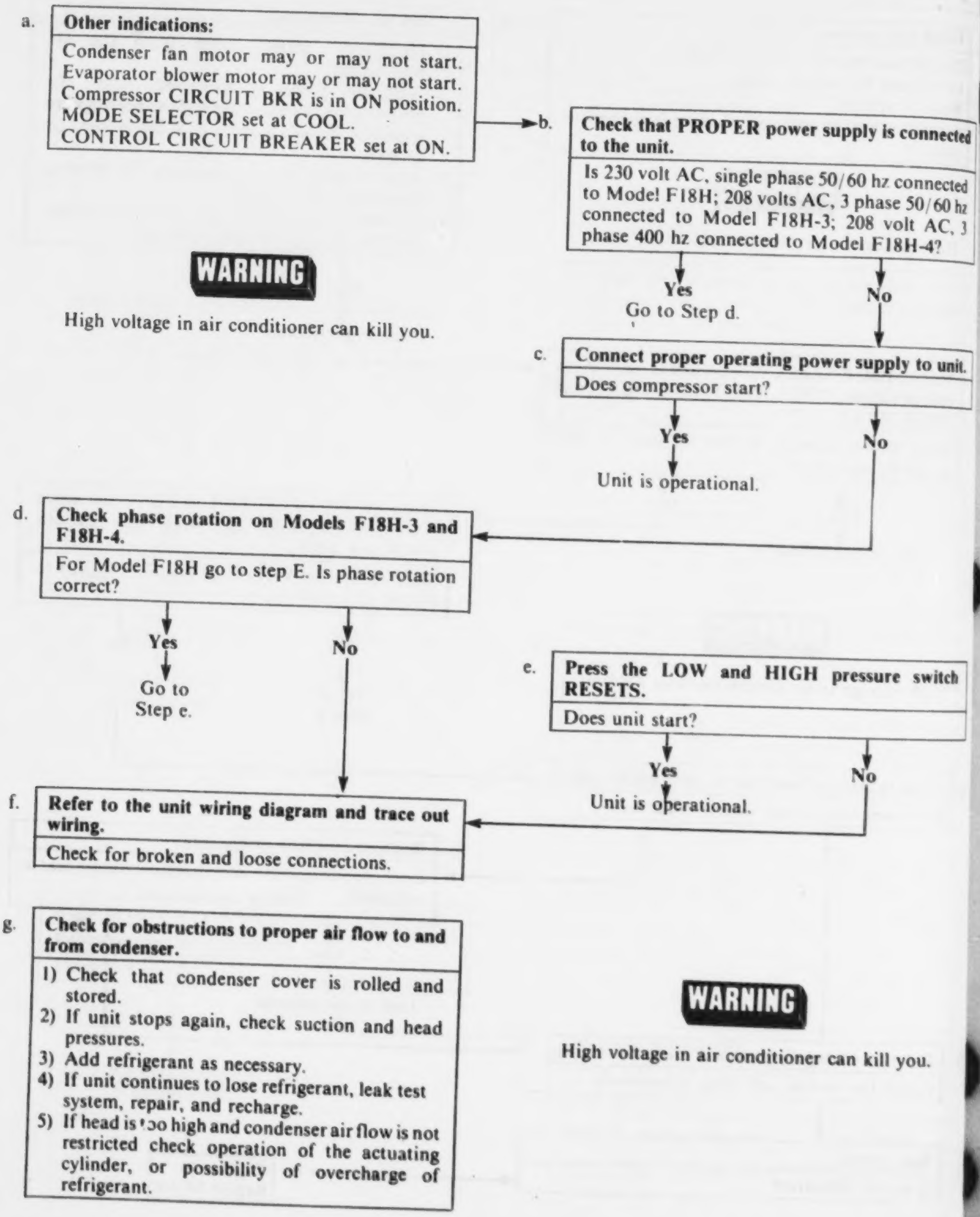
Test motor.

Is motor defective?

Replace or Repair Motor

best copy available

4-4. COMPRESSOR FAILS TO START



a. **Other indications:**

Condenser fan motor may or may not start.
Evaporator blower motor may or may not start.
Compressor CIRCUIT BKR is in ON position.
MODE SELECTOR set at COOL.
CONTROL CIRCUIT BREAKER set at ON.

b. **Check that PROPER power supply is connected to the unit.**

Is 230 volt AC, single phase 50/60 hz connected to Model F18H; 208 volts AC, 3 phase 50/60 hz connected to Model F18H-3; 208 volt AC, 3 phase 400 hz connected to Model F18H-4?

Yes Go to Step d.

No

WARNING

High voltage in air conditioner can kill you.

c. **Connect proper operating power supply to unit.**

Does compressor start?

Yes Unit is operational.

No

d. **Check phase rotation on Models F18H-3 and F18H-4.**

For Model F18H go to step E. Is phase rotation correct?

Yes Go to Step e.

No

e. **Press the LOW and HIGH pressure switch RESETS.**

Does unit start?

Yes Unit is operational.

No

f. **Refer to the unit wiring diagram and trace out wiring.**

Check for broken and loose connections.

g. **Check for obstructions to proper air flow to and from condenser.**

1) Check that condenser cover is rolled and stored.
2) If unit stops again, check suction and head pressures.
3) Add refrigerant as necessary.
4) If unit continues to lose refrigerant, leak test system, repair, and recharge.
5) If head is too high and condenser air flow is not restricted check operation of the actuating cylinder, or possibility of overcharge of refrigerant.

WARNING

High voltage in air conditioner can kill you.

4-5. CONDENSER FAN FAILS TO START

a. **Other indications:**

Evaporator blower motor may or may not start.
Compressor CIRCUIT BKR is in ON position.
MODE SELECTOR set at COOL.
CONTROL CIRCUIT BREAKER set at ON.

WARNING

High voltage in air conditioner can kill you.

b. **Check bearings.**

1) Disconnect power cable from the air conditioner.
2) With the power disconnected, rotate fan by hand to see if the fan is binding or loose on motor shaft.
3) Check to see if fan is rubbing and/or sticking against the fan inlet.
4) Repair as necessary.
5) Reconnect power cable.

Did this repair solve the problem

Yes

Unit is operational.

No

c. **Check Selector Switch**

Connect power cable and move MODE SELECTOR switch to COOL.

Does compressor and evaporator blower operate?

Yes

Refer to paragraph 4-4 steps b thru e.

No

d. **Test the motor.**

Is motor defective?

Yes

Replace motor

No

e. **Refer to table 4-3 and test switch S1 and Relay K4.**

Is switch or relay defective?

Yes

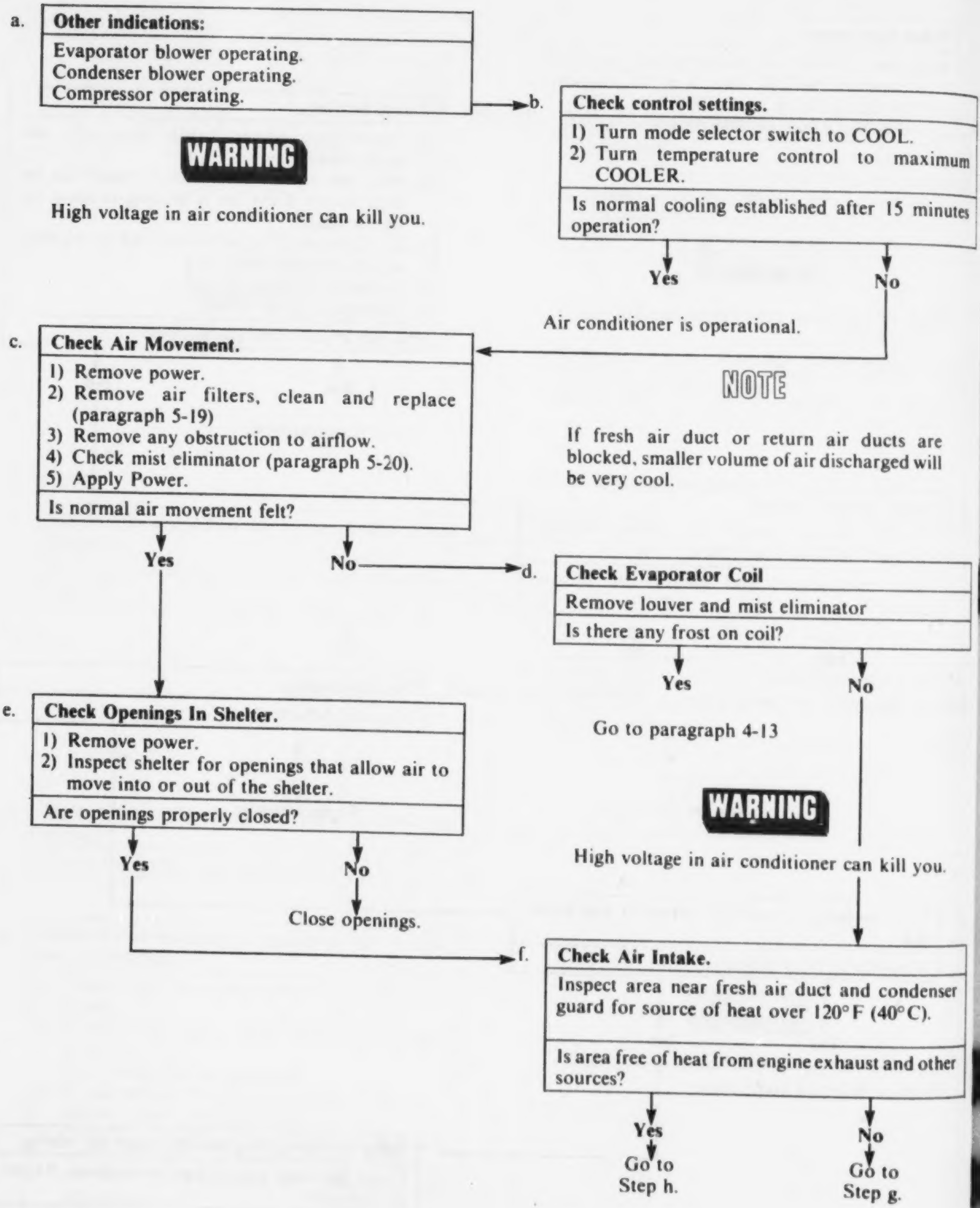
Replace defective component.

No

f. **Refer to wiring diagram and trace out wiring.**

Check for loose and broken connections. Repair as necessary.

4-6. LITTLE OR NO COOLING ACTION



a. **Other indications:**

Evaporator blower operating.
Condenser blower operating.
Compressor operating.

WARNING

High voltage in air conditioner can kill you.

b. **Check control settings.**

1) Turn mode selector switch to COOL.
2) Turn temperature control to maximum COOLER.

Is normal cooling established after 15 minutes operation?

Yes — Air conditioner is operational.

No — go to c.

c. **Check Air Movement.**

1) Remove power.
2) Remove air filters, clean and replace (paragraph 5-19)
3) Remove any obstruction to airflow.
4) Check mist eliminator (paragraph 5-20).
5) Apply Power.

Is normal air movement felt?

Yes — go to e.

No — go to d.

NOTE

If fresh air duct or return air ducts are blocked, smaller volume of air discharged will be very cool.

d. **Check Evaporator Coil**

Remove louver and mist eliminator

Is there any frost on coil?

Yes — Go to paragraph 4-13

No — go to f.

WARNING

High voltage in air conditioner can kill you.

e. **Check Openings In Shelter.**

1) Remove power.
2) Inspect shelter for openings that allow air to move into or out of the shelter.

Are openings properly closed?

Yes — go to f.

No — Close openings.

f. **Check Air Intake.**

Inspect area near fresh air duct and condenser guard for source of heat over 120° F (40° C).

Is area free of heat from engine exhaust and other sources?

Yes — Go to Step h.

No — Go to Step g.

g. **Move any source of heat at least 10 feet from air conditioner.**

Is cooling action effective?

Yes — Air conditioner is operational.

No — h.

h. **Check Refrigerant.**

1) Operate air conditioner for 15 minutes with temperature control in maximum COOLER position.
2) Inspect liquid in sight glass (on back of condenser section).

Is liquid clear and bubble-free?

No — i.

Yes — j.

i. **Use leak detector to find refrigerant leak. (paragraph 6-2).**

1) Repair or change defective part or repair leak.
2) Charge system with refrigerant (Paragraph 6-6 or 6-7.
3) Operate air conditioner for 15 minutes with temperature control in maximum COOLER position.

Is cooling action effective?

Yes — Air conditioner is operational

No — k.

WARNING

High voltage in air conditioner can kill you.

j. **Check Refrigerant System.**

1) Measure ambient outside temperature.
2) Operate air conditioner in COOL mode with maximum COOLER temperature setting for at least 15 minutes.
3) Measure condenser discharge air temperature which should be 30 to 40° F (-1 to 4° C) above ambient.
4) Measure temperatures of air going into (return) and out of (discharge) evaporator section.
5) Discharge should be 15 to 25° F (-10 to -4° C) lower than return air temperature.

Are temperatures within tolerances?

Yes — Air conditioner is operational.

No — Go to Step k.

k. **Check Liquid Line Solenoid Valve L2 Coil.**

1) Remove power.
2) Remove top cover, condenser.
3) Disconnect leads from valve coil L2.
4) Measure resistance of coil L2.

Is coil resistance 25 to 50 ohms?

Yes — Connect Leads

No — l.

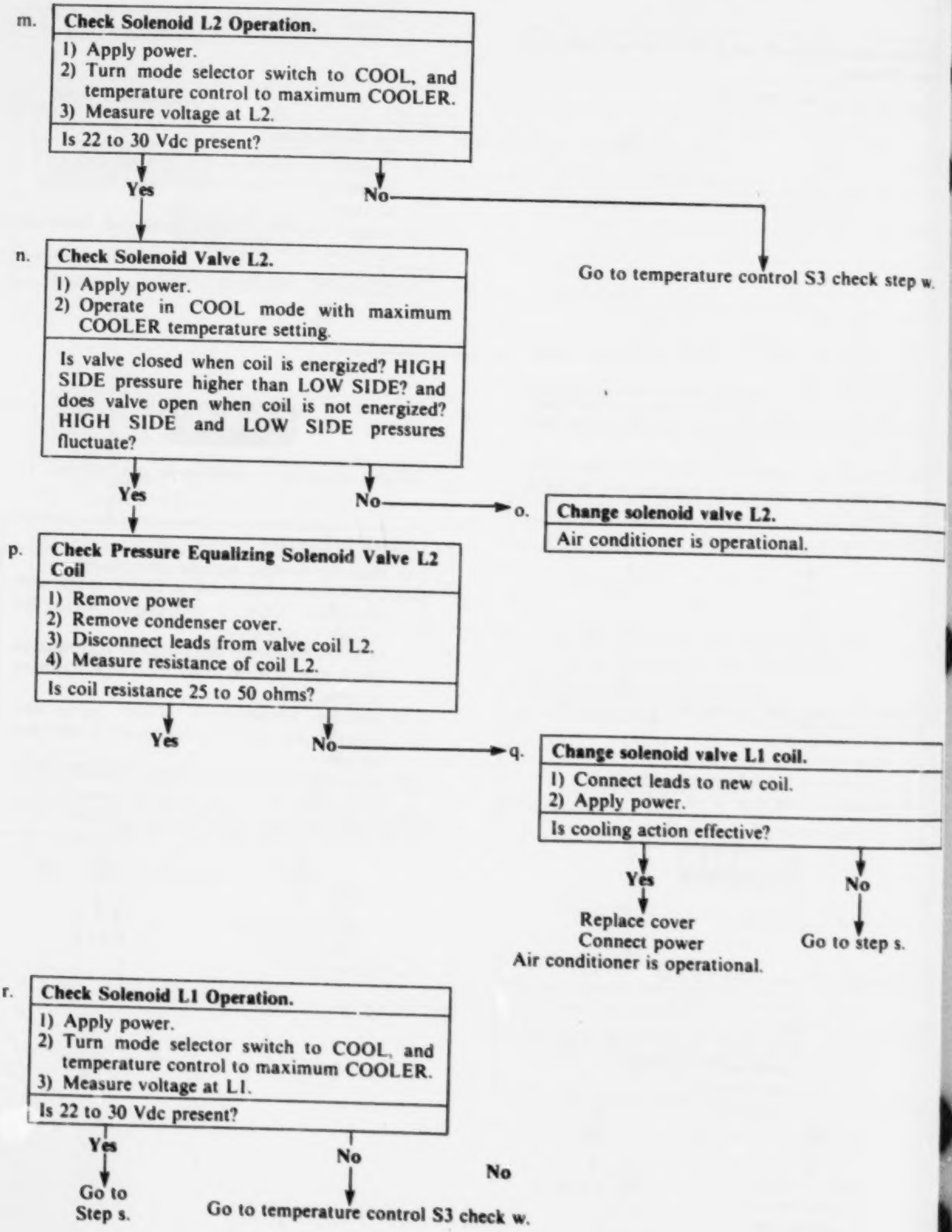
l. **Change solenoid valve L2 coil.**

1) Connect leads to new coil.
2) Apply Power.
3) Operate in COOL mode with maximum COOLER temperature setting.

Is cooling action effective?

Yes — Replace cover. Air conditioner is operational.

No — Go to step m.



m. **Check Solenoid L2 Operation.**

1) Apply power.
2) Turn mode selector switch to COOL, and temperature control to maximum COOLER.
3) Measure voltage at L2.

Is 22 to 30 Vdc present?

Yes → n.

No → Go to temperature control S3 check step w.

n. **Check Solenoid Valve L2.**

1) Apply power.
2) Operate in COOL mode with maximum COOLER temperature setting.

Is valve closed when coil is energized? HIGH SIDE pressure higher than LOW SIDE? and does valve open when coil is not energized? HIGH SIDE and LOW SIDE pressures fluctuate?

Yes → p.

No → o.

o. **Change solenoid valve L2.**

Air conditioner is operational.

p. **Check Pressure Equalizing Solenoid Valve L2 Coil**

1) Remove power
2) Remove condenser cover.
3) Disconnect leads from valve coil L2.
4) Measure resistance of coil L2.

Is coil resistance 25 to 50 ohms?

Yes

No → q.

q. **Change solenoid valve L1 coil.**

1) Connect leads to new coil.
2) Apply power.

Is cooling action effective?

Yes → Replace cover
Connect power
Air conditioner is operational.

No → Go to step s.

r. **Check Solenoid L1 Operation.**

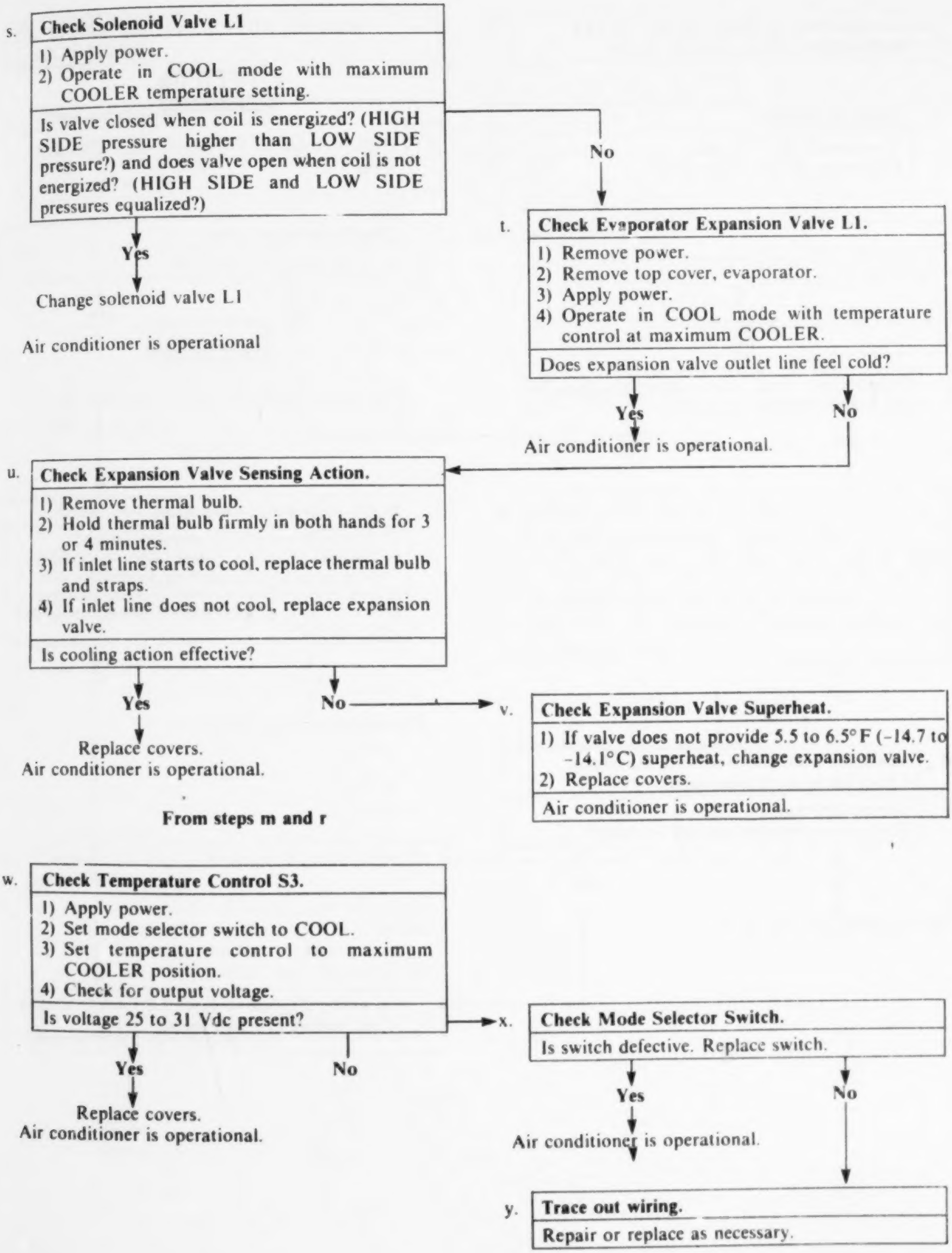
1) Apply power.
2) Turn mode selector switch to COOL, and temperature control to maximum COOLER.
3) Measure voltage at L1.

Is 22 to 30 Vdc present?

Yes → Go to Step s.

No → Go to temperature control S3 check w.

No



s. **Check Solenoid Valve L1**

1) Apply power.
2) Operate in COOL mode with maximum COOLER temperature setting.

Is valve closed when coil is energized? (HIGH SIDE pressure higher than LOW SIDE pressure?) and does valve open when coil is not energized? (HIGH SIDE and LOW SIDE pressures equalized?)

Yes

Change solenoid valve L1

Air conditioner is operational

No

t. **Check Evaporator Expansion Valve L1.**

1) Remove power.
2) Remove top cover, evaporator.
3) Apply power.
4) Operate in COOL mode with temperature control at maximum COOLER.

Does expansion valve outlet line feel cold?

Yes

Air conditioner is operational.

No

u. **Check Expansion Valve Sensing Action.**

1) Remove thermal bulb.
2) Hold thermal bulb firmly in both hands for 3 or 4 minutes.
3) If inlet line starts to cool, replace thermal bulb and straps.
4) If inlet line does not cool, replace expansion valve.

Is cooling action effective?

Yes

Replace covers.
Air conditioner is operational.

No

v. **Check Expansion Valve Superheat.**

1) If valve does not provide 5.5 to 6.5°F (-14.7 to -14.1°C) superheat, change expansion valve.
2) Replace covers.

Air conditioner is operational.

From steps m and r

w. **Check Temperature Control S3.**

1) Apply power.
2) Set mode selector switch to COOL.
3) Set temperature control to maximum COOLER position.
4) Check for output voltage.

Is voltage 25 to 31 Vdc present?

Yes

Replace covers.
Air conditioner is operational.

No

x. **Check Mode Selector Switch.**

Is switch defective. Replace switch.

Yes

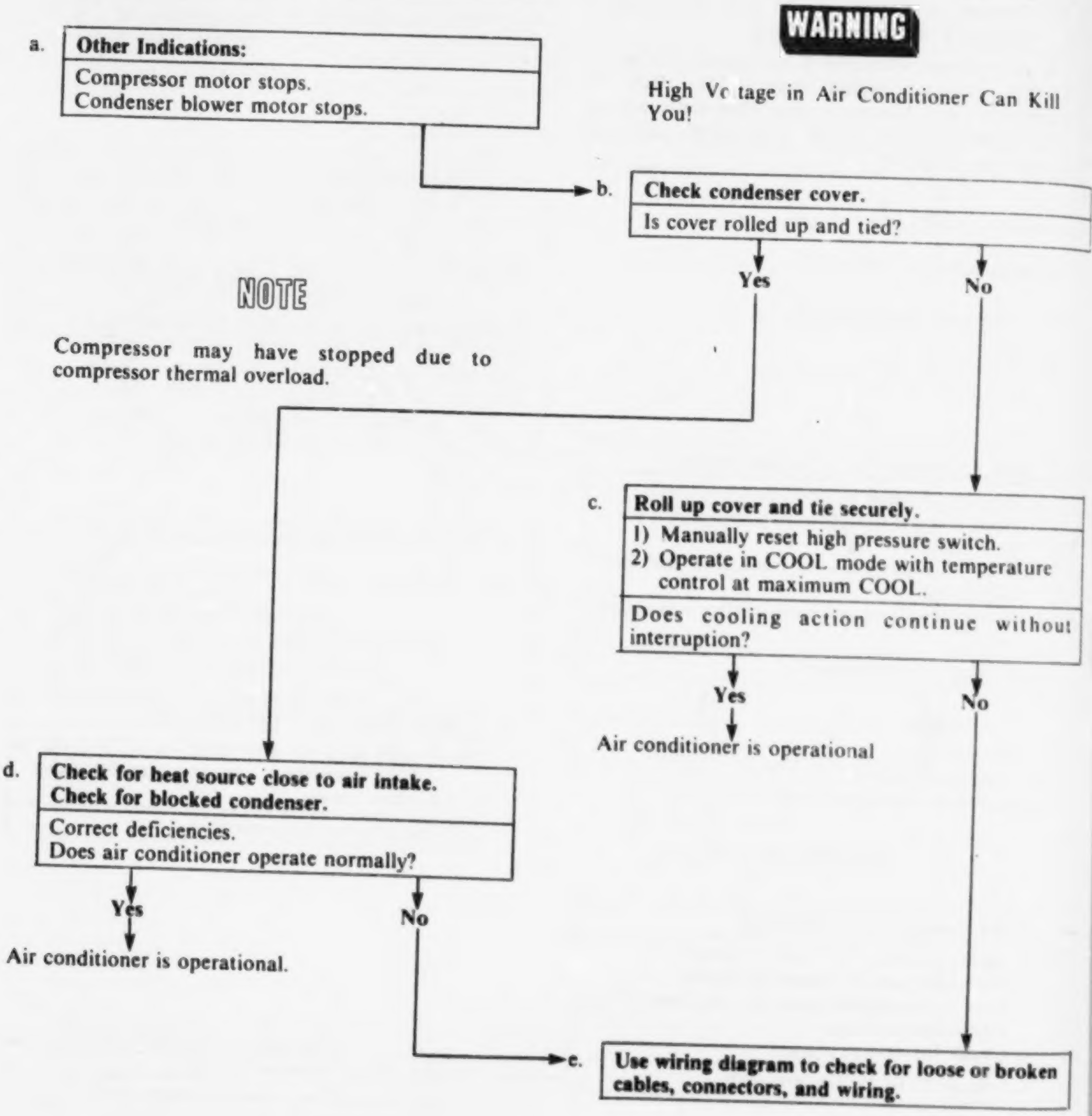
Air conditioner is operational.

No

y. **Trace out wiring.**

Repair or replace as necessary.

4-7. COOLING ACTION STOPS AFTER OPERATING FOR SHORT TIME



a. **Other Indications:**

Compressor motor stops.
Condenser blower motor stops.

WARNING

High Voltage in Air Conditioner Can Kill You!

b. **Check condenser cover.**

Is cover rolled up and tied?

NOTE

Compressor may have stopped due to compressor thermal overload.

c. **Roll up cover and tie securely.**

1) Manually reset high pressure switch.
2) Operate in COOL mode with temperature control at maximum COOL.

Does cooling action continue without interruption?

Air conditioner is operational

d. **Check for heat source close to air intake.**
Check for blocked condenser.

Correct deficiencies.
Does air conditioner operate normally?

Air conditioner is operational.

e. **Use wiring diagram to check for loose or broken cables, connectors, and wiring.**

4-8. LITTLE OR NO HEATING IN LOW HEAT MODE

a. **Other indications:**

Evaporator blower is operating.
Proper power supply is supplied and properly connected to unit.

WARNING

High Voltage in Air Conditioner Can Kill You!

NOTE

This unit can operate in temperatures as low as -50°F (-45.5°C). However, depending on shelter size, shelter heat loss, and amount of heat generated by equipment in the shelter, heat output low heat mode may or may not heat shelter to a comfortable level.

b. **Check air movement in evaporator section.**

1) Apply power.
2) Set mode selector switch to LOW HEAT.
3) Turn temperature control to maximum WARMER position.
4) Feel air ducts for air movement in and out of air conditioner.

Is air moving into return air filter and out discharge opening?

Yes

No

c. **Check reason for low air flow.**

1) Turn mode selector switch to OFF.
2) Remove return air filter, clean and replace (Paragraph 5-19)
3) Remove any obstruction to air flow.
4) Check mist eliminator (Paragraph 5-20).

Is heating action effective?

Yes

Air Conditioner is operational.

No

d. **Compare discharge air temperature to return air temperature.**

1) Turn mode selector switch to LOW HEAT and temperature control to maximum WARMER.
2) After operating for five minutes, measure return air temperature and discharge air temperature.

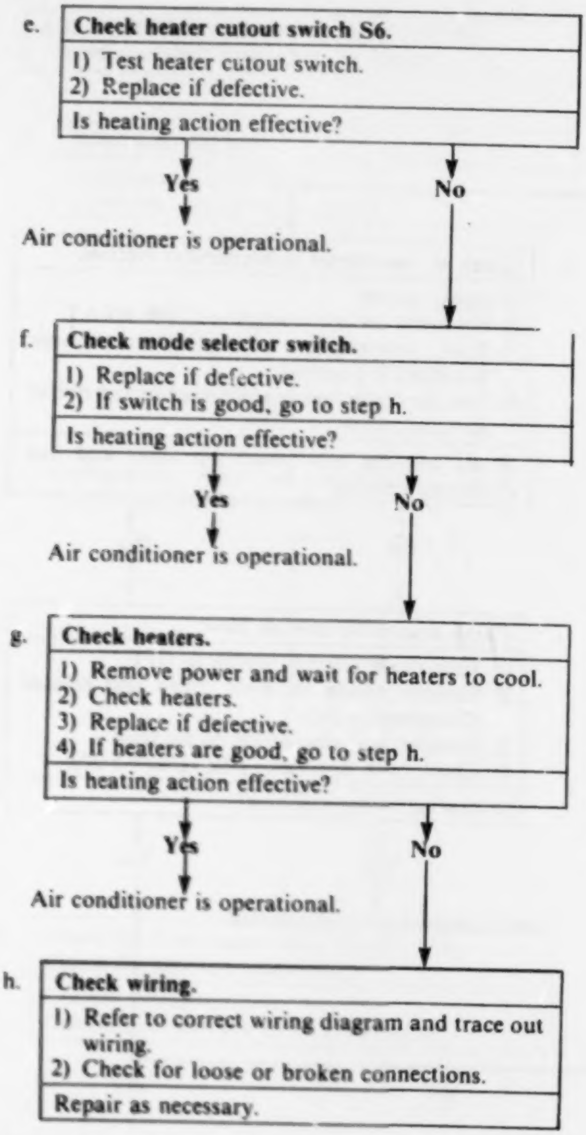
Is discharge air temperature at least 10°F (5.5°C) above return air temperature?

Yes

Go to Step g.

No

Go to Step e.



e. **Check heater cutout switch S6.**

1) Test heater cutout switch.
2) Replace if defective.

Is heating action effective?

Yes — Air conditioner is operational.

No

f. **Check mode selector switch.**

1) Replace if defective.
2) If switch is good, go to step h.

Is heating action effective?

Yes — Air conditioner is operational.

No

g. **Check heaters.**

1) Remove power and wait for heaters to cool.
2) Check heaters.
3) Replace if defective.
4) If heaters are good, go to step h.

Is heating action effective?

Yes — Air conditioner is operational.

No

h. **Check wiring.**

1) Refer to correct wiring diagram and trace out wiring.
2) Check for loose or broken connections.

Repair as necessary.

4-9. LITTLE OR NO ADDITIONAL HEATING IN HIGH HEAT.

a. **Other indications:**

Evaporator blower is operating.
Proper power supply is supplied and properly connected to unit.
Controls are set for HIGH HEAT.

WARNING

High voltage in air conditioner can kill you.

NOTE

This unit can operate in temperatures as low as -50°F (-45.5°C). However, depending on excessive shelter heat loss, and extremely low amount of heat generated by equipment in the shelter, heat output may or may not heat shelter to a comfortable level.

b. **Check that TEMPERATURE SELECTOR is set to the extreme WARMER position (clockwise as far as it will go).**

Move to maximum WARMER. After operating for five minutes, check air temperature.

Is heating action effective?

Yes — Air conditioner is operational.

No — go to c.

c. **Check openings in shelter.**

1) Inspect shelter for openings that allow cold air to move into the shelter.
2) Seal all openings.

Are openings properly closed? Is heating action effective?

Yes — Air conditioner is operational.

No — go to d.

d. **Check air movement into and out of the air conditioner.**

1) Check air filter.
2) Clean the filter.
3) Check for and remove obstructions to free air flow.

Is heating action effective?

Yes — Air conditioner is operational.

No — go to e.

e. **Check heater cutout switch S6.**

1) Test the switch.
2) Replace if necessary.
3) After switch is replaced, operate unit for five minutes and check air temperature.

Is heating action effective?

Yes — Air conditioner is operational.

No — Go to Step f.

f. **Check MODE SELECTOR switch S1.**

1) Replace if defective.
2) If switch is good go to step f.

Is heating action effective?

Yes — Air conditioner is operational

No

g. **Check RELAY K2.**

1) If defective replace.
2) After operating for five minutes, check air temperature.

Is heating action effective?

Yes — Air conditioner is operational

No

h. **Test heaters.**

1) Remove power and wait for heaters to cool.
2) Replace if defective.
3) If heaters are good, go to step h.

Is heating action effective?

Yes — Air conditioner is operational.

No

i. **Check wiring.**

1) Refer to correct wiring diagram
2) Trace out wiring.
3) Check for loose or broken connections.

Repair as necessary.

4-10. TEMPERATURE SELECTOR NOT EFFECTIVE

WARNING

High voltage in air conditioner can kill you.

NOTE

It may be necessary to clean the evaporator coil.

a. **Other indications:**

All components operating.

Correct power supply is connected to the unit.

b. **Check air filter.**

1) Remove front return air grille.
2) Clean the return air filter
3) Clean the temperature sensing bulb.
4) Operate the unit for five minutes and check air temperature.

Is temperature within limits?

Yes — Air conditioner is operational.

No → c.

c. **Check the temperature selector switch.**

1) Replace if it is defective.
2) Operate the unit for five minutes and check air temperature.

Is temperature within limits?

Yes — Air conditioner is operational.

No → d.

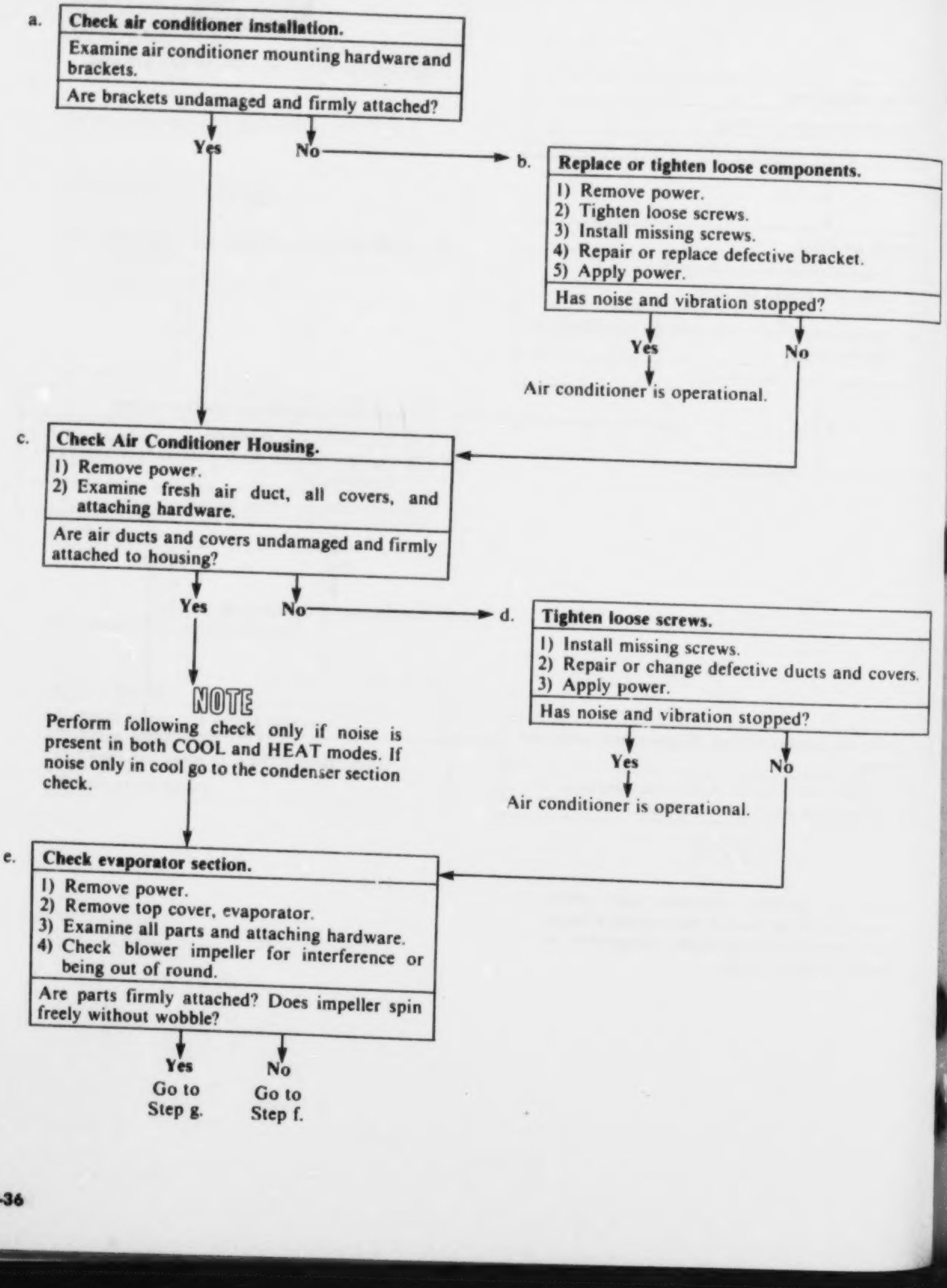
d. **Refer to correct wiring diagram and trace out wiring.**

1) Check for loose or broken connections.
2) Repair or replace as necessary.

NOTE

Due to weather extremes and shelter heating/cooling loads it may require a longer time period to bring shelter temperature to desired comfort range.

4-11. UNUSUAL NOISE OR VIBRATION



a. **Check air conditioner installation.**

Examine air conditioner mounting hardware and brackets.

Are brackets undamaged and firmly attached?

Yes — No

b. **Replace or tighten loose components.**

1) Remove power.
2) Tighten loose screws.
3) Install missing screws.
4) Repair or replace defective bracket.
5) Apply power.

Has noise and vibration stopped?

Yes — No

Air conditioner is operational.

c. **Check Air Conditioner Housing.**

1) Remove power.
2) Examine fresh air duct, all covers, and attaching hardware.

Are air ducts and covers undamaged and firmly attached to housing?

Yes — No

d. **Tighten loose screws.**

1) Install missing screws.
2) Repair or change defective ducts and covers.
3) Apply power.

Has noise and vibration stopped?

Yes — No

Air conditioner is operational.

NOTE

Perform following check only if noise is present in both COOL and HEAT modes. If noise only in cool go to the condenser section check.

e. **Check evaporator section.**

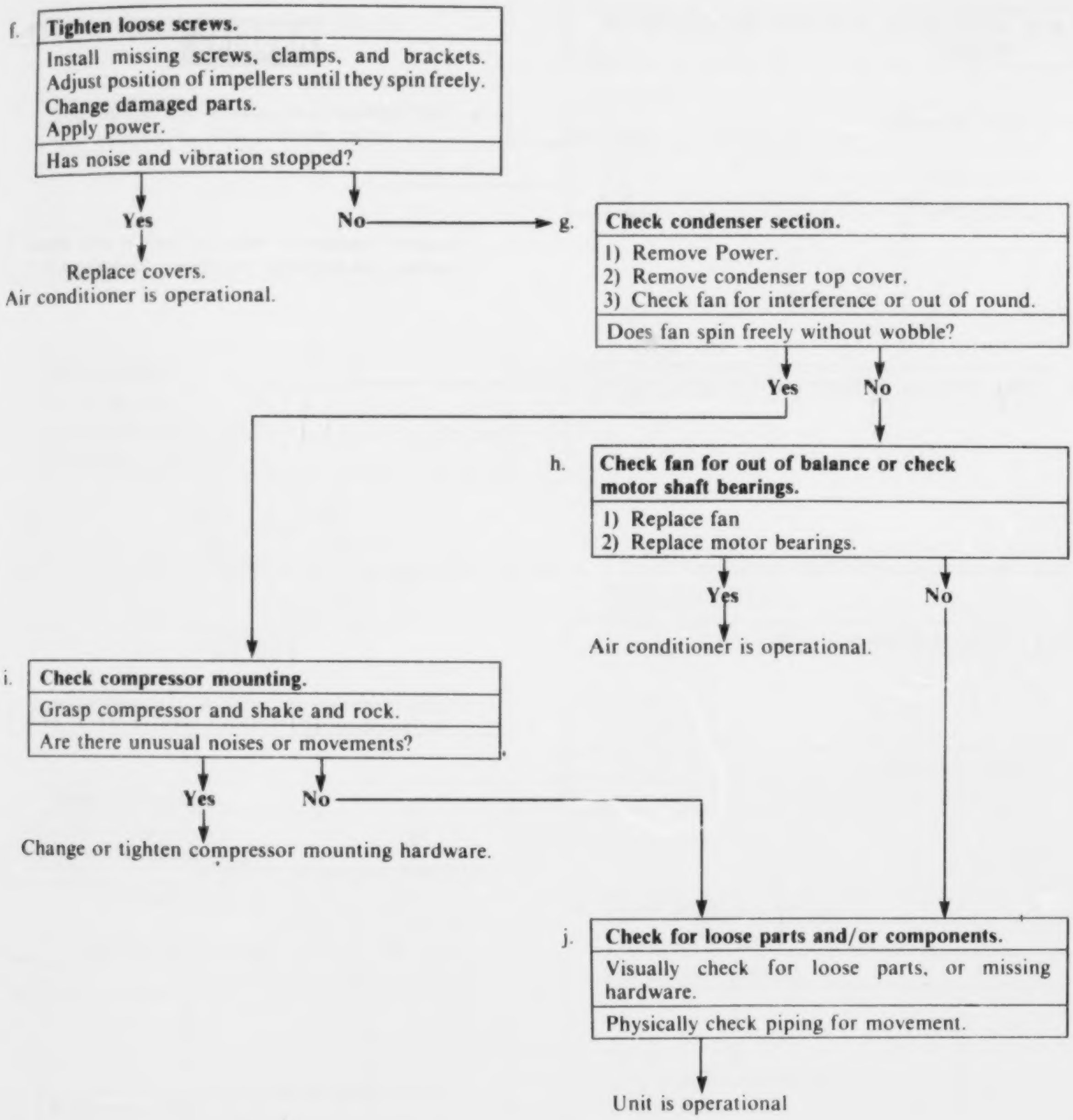
1) Remove power.
2) Remove top cover, evaporator.
3) Examine all parts and attaching hardware.
4) Check blower impeller for interference or being out of round.

Are parts firmly attached? Does impeller spin freely without wobble?

Yes — No

Go to Step g.

Go to Step f.



f. **Tighten loose screws.**

Install missing screws, clamps, and brackets.
Adjust position of impellers until they spin freely.
Change damaged parts.
Apply power.

Has noise and vibration stopped?

Yes — Replace covers. Air conditioner is operational.

No — g.

g. **Check condenser section.**

1) Remove Power.
2) Remove condenser top cover.
3) Check fan for interference or out of round.

Does fan spin freely without wobble?

Yes — i.

No — h.

h. **Check fan for out of balance or check motor shaft bearings.**

1) Replace fan
2) Replace motor bearings.

Yes — Air conditioner is operational.

No — j.

i. **Check compressor mounting.**

Grasp compressor and shake and rock.

Are there unusual noises or movements?

Yes — Change or tighten compressor mounting hardware.

No — j.

j. **Check for loose parts and/or components.**

Visually check for loose parts, or missing hardware.

Physically check piping for movement.

Unit is operational

4-12. UNIT RUNS, BUT DISCHARGE AIR IS WARM

WARNING

High voltage in air conditioner can kill you.

a. **Other indications:**

All components are functioning.
Power supply is correct.
Operating within design limits.

b. **Connect gauges to charging valves and check suction and discharge pressures. (Paragraph 6-1)**

c. **After checking pressures, refer to paragraph 4-6**

4-13. Frosted Evaporator Coil

NOTE

Stop operation and allow frost to melt before troubleshooting.

a. **Other indications:**

Air conditioner is operating.

b. **Check evaporator air flow.**

1) Check air filter and mist eliminator.
2) Clean or replace.
3) Check air flow obstructions. Remove.

Did this eliminate problem?

Yes — Unit is operational.

No — go to c.

c. **Evaporator fan speed too low.**

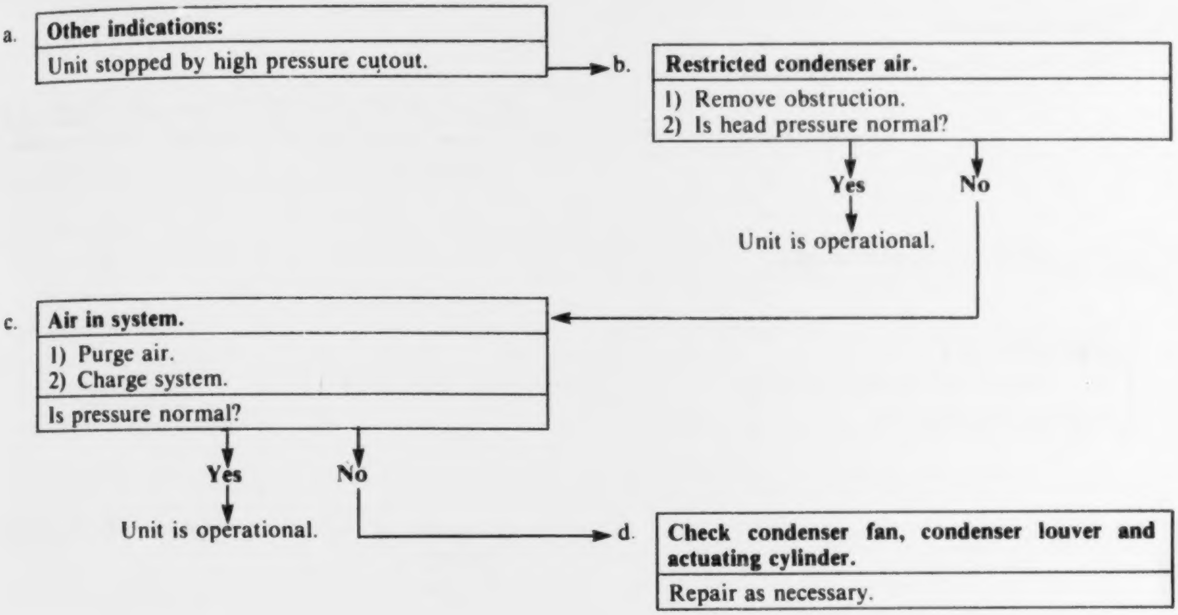
1) Move switch to HIGH.
2) If switch set at HIGH, check motor and switch.
3) Replace as necessary

Did this eliminate problem?

Yes — Unit is operational.

No — **Check refrigerant charge.**

4-14. EXCESSIVE HEAD PRESSURE.



a. **Other indications:**

Unit stopped by high pressure cutout.

b. **Restricted condenser air.**

1) Remove obstruction.
2) Is head pressure normal?

Unit is operational.

c. **Air in system.**

1) Purge air.
2) Charge system.

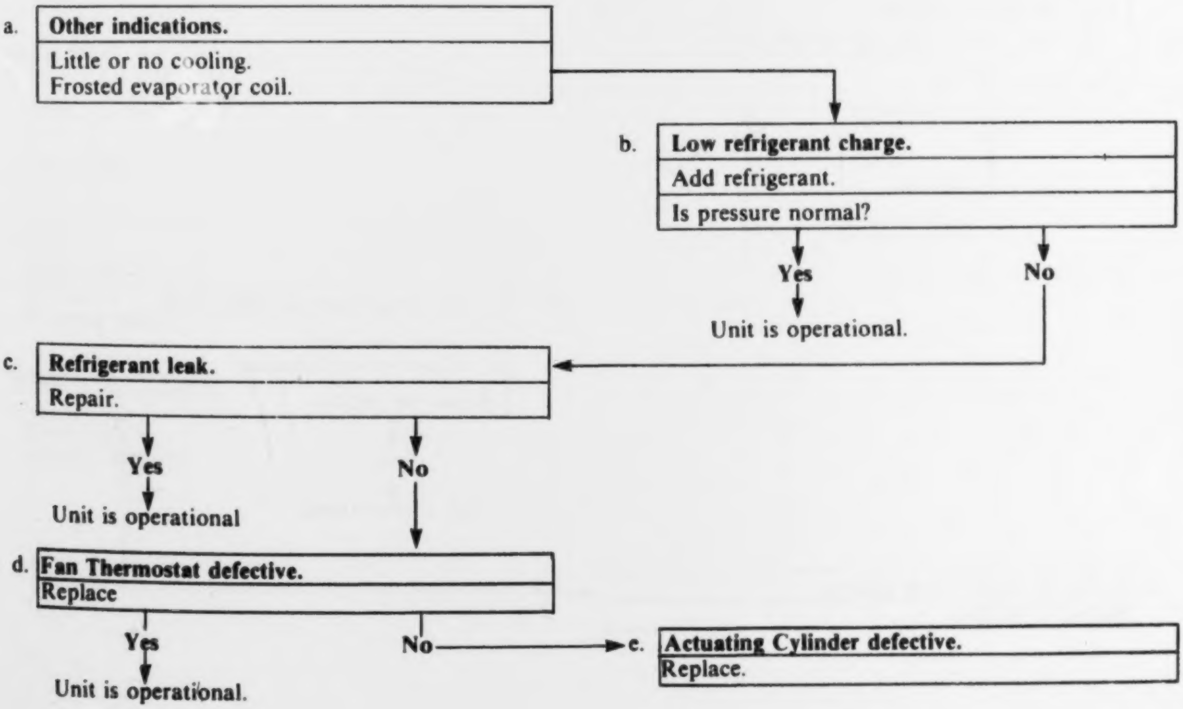
Is pressure normal?

Unit is operational.

d. **Check condenser fan, condenser louver and actuating cylinder.**

Repair as necessary.

4-15. LOW HEAD PRESSURE



a. **Other indications.**

Little or no cooling.
Frosted evaporator coil.

b. **Low refrigerant charge.**

Add refrigerant.

Is pressure normal?

Unit is operational.

c. **Refrigerant leak.**

Repair.

Unit is operational

d. **Fan Thermostat defective.**

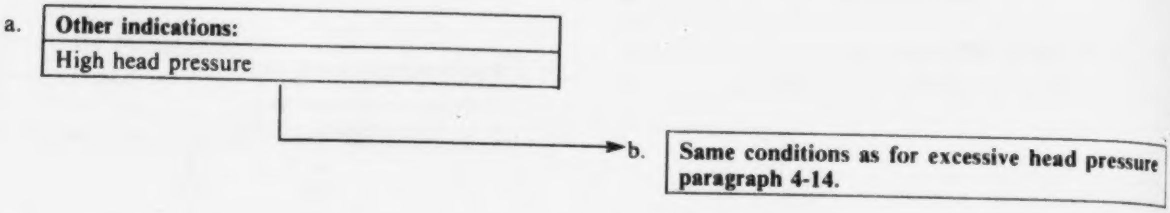
Replace

Unit is operational.

e. **Actuating Cylinder defective.**

Replace.

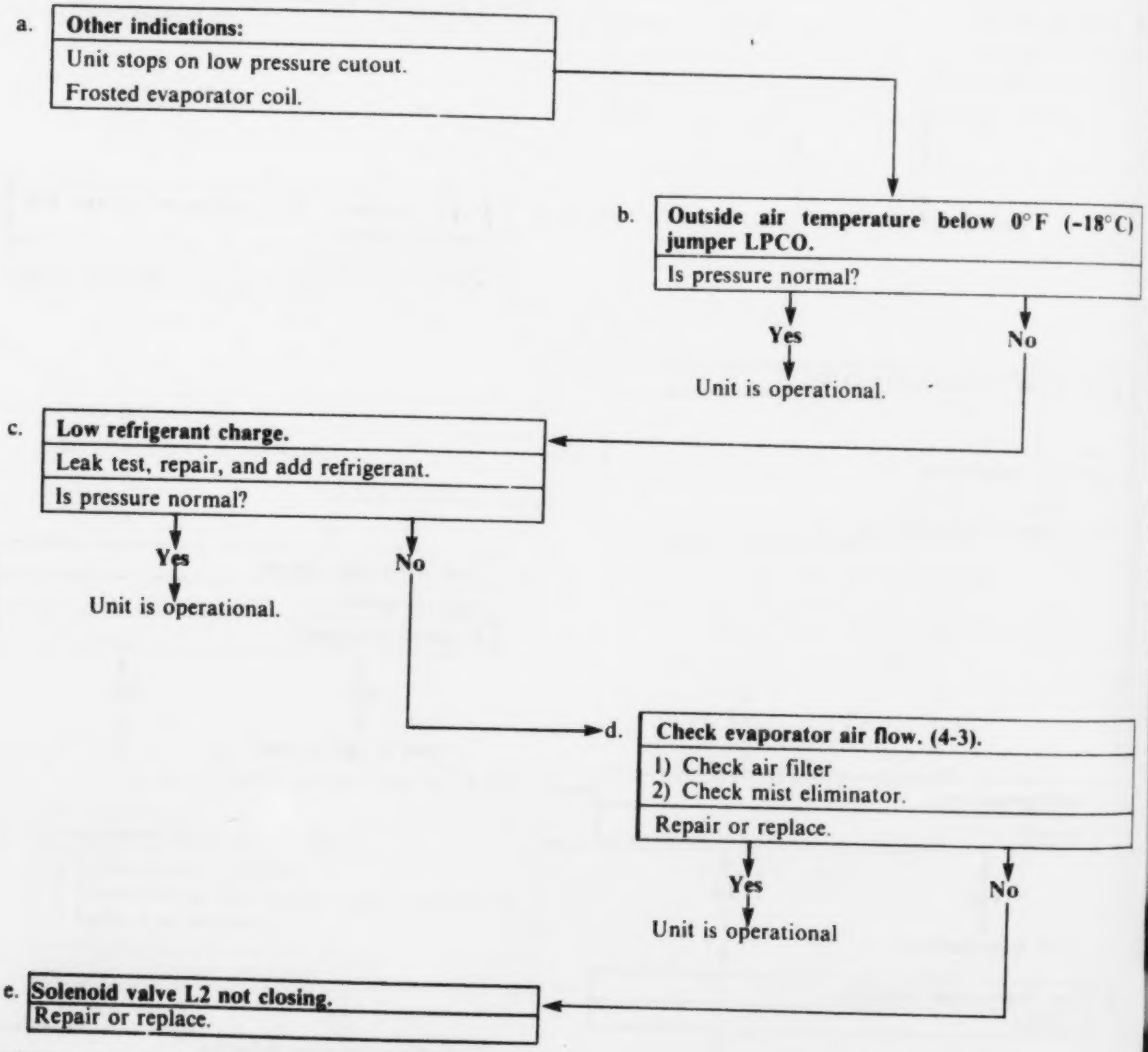
4-16. EXCESSIVE SUCTION PRESSURE



a. **Other indications:**
High head pressure

b. **Same conditions as for excessive head pressure paragraph 4-14.**

4-17. LOW SUCTION PRESSURE



a. **Other indications:**
Unit stops on low pressure cutout.
Frosted evaporator coil.

b. **Outside air temperature below 0°F (-18°C) jumper LPCO.**
Is pressure normal?
Yes — Unit is operational.
No — go to c.

c. **Low refrigerant charge.**
Leak test, repair, and add refrigerant.
Is pressure normal?
Yes — Unit is operational.
No — go to d.

d. **Check evaporator air flow. (4-3).**
1) Check air filter
2) Check mist eliminator.
Repair or replace.
Yes — Unit is operational
No — go to e.

e. **Solenoid valve L2 not closing.**
Repair or replace.

CHAPTER 5

ORGANIZATIONAL MAINTENANCE

5-1. GENERAL MAINTENANCE PROCEDURES.

This task covers:

a. Removal
b. Testing
c. Inspection
d. Splicing Wires
e. Crimping terminals
f. Insulating joints
g. Soldering connections

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Solvent PD680
Detergent
Cleaning Cloths

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Organizational Maintenance

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. The electrical circuits in the air conditioner are completed by individual wire leads or by wire leads laced or enclosed in "Ty-raps" to form a wiring harness.	**WARNING** High Voltage can Kill.
	b. All of the wiring carries code numbers.	. . .
	c. When repairing, or replacing the wiring harness or individual wires, refer to the wiring diagrams. FO-1, FO-3, FO-5, or FO-6.1.	. . .
	WARNING Disconnect air conditioner power supply before performing maintenance work on electrical system.	
	d. Preferred repair methods consist of replacing wires, terminals, connectors, etc. rather than splicing wires, bending ends to form terminals, and other makeshift procedures.	. . .
	e. Determine the proper size and length of wire, terminal or connector to be used for replacement.	. . .
TESTING	a. Use a multimeter set on low ohms range to test for continuity.	. . .
	b. Use multimeter set on high ohm range to test for shorts between the circuit in a component and the outside case of the component.	. . .
	c. When testing electrical component, also look for visual damage and inspect all wiring in the area for damage or loose connections.	. . .
	d. Test for continuity in leads or wiring harnesses by disconnecting each end.	. . .
	e. Where wires terminate in an electrical connector, disconnect connector from corresponding receptacle connector or plug connector.	. . .
	f. Touch the test probes of a multimeter set on low ohms range to ends of wire or to corresponding pin of connector.	. . .
	g. If continuity is not indicated, repair or replace wire.	. . .

LOCATION/ITEM	ACTION	REMARKS
INSPECTION	a. Inspect all wiring installations for cracked or frayed insulation material.	. . .
	b. Pay particular attention to wires passing through holes in the frame or around sharp edges.	. . .
	c. Repair or replace defective wiring.	. . .
	d. Inspect electrical connectors and fittings for damage or broken conditions.	. . .
	e. Replace defective connectors and fittings.	. . .
SPLICING WIRES	a. To repair broken or cut wires that are otherwise sound, the mating ends can be stripped and spliced.	. . .
	b. A commercial butt splice can be crimped onto the ends to join them, or a wire splice can be made.	. . .
	c. A wire splice is made by stripping one 1-¼ inch of insulation from the wire ends, holding the ends parallel and facing opposite directions, then twisting each end around the other wire at least three turns.	. . .
	d. Solder and apply insulation.	. . .
CRIMPING TERMINALS	a. To install a terminal on end of a wire, strip ¼ - ½ inch of insulation from the end of the wire.	. . .
	b. Apply a one-inch piece of heat-shrink tubing (if the terminals are of the uninsulated type), and insert wire-end into the shank of the terminal.	. . .
	c. Crimp the shank.	. . .
	d. Install heat-shrink tubing if necessary.	. . .
INSULATING JOINTS	a. The preferred method of insulating electrical joints is by the use of heat-shrink tubing.	. . .
	b. To apply, cut a piece of heat-shrink tubing of suitable diameter to a one-inch length for covering joints at terminals or connectors, or to a length about ½-inch longer than the joint to be insulated.	. . .

LOCATION/ITEM	ACTION	REMARKS
INSULATING JOINTS	c. Slide the tubing over the wire before making the joint.	. . .
	d. After the joint is made, slide the tubing over the joint and shrink in place with moderate heat.	. . .
SOLDERING CONNECTIONS	a. Wire connections must be made mechanically sound before they are soldered.	. . .
	b. Solder alone does not provide sufficient strength to prevent breakage.	. . .
	c. Joining surfaces of connections to be soldered must be clean and bright.	. . .
	d. If a separate flux is used, it should conform to Specification MIL-F-4995, Type I, rosin-alcohol flux, and should be brushed onto the joint before soldering.	. . .
	e. If a flux-core solder is used, it should always be rosin-core electrical solder.	. . .
	f. If an uncored solder is used it should be a lead-tin solder conforming to Specification QQ-S-571.	. . .
	g. Wires should always be heated to the point at which the solder will melt completely and flow into all parts of the joint.	. . .
	h. Excessive build-up of solder "gobs" on the joint should be avoided or removed.	. . .
PREVENTIVE MAINTENANCE CHECKS	a. Refer to table 5-1.	. . .

Table 5-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-Quarterly (250 Hours)

Item No.	Interval Q	Item to be Inspected	Procedures
1	●	Air Filters	Check that filters are clean.
2	●	Mist Eliminator	Check that eliminator is clean.
3	●	Evaporator Coil	Check that coil is clean.
4	●	Condenser Coil	Check that coil is clean.
5	●	Evaporator Motor	Check that motor is clean. Turn shaft to be sure bearings are not defective.
6	●	Condenser Motor	Check that motor is clean. Turn shaft to be sure bearings are not defective.
7	●	Air Conditioner Unit	Lubricate all movable connections and linkage with SAE 20 oil. Check for loose, missing, or damaged components.

All data on page 5-6 deleted.

-2. RADIO INTERFERENCE SUPPRESSION.

This task covers:

a. General Information

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
GENERAL	a. Essentially suppression is attained by providing a low resistance path to ground for the stray currents. Methods used include grounding the frame with banding straps and using capacitors and resistors.	. . .
	b. The control module, junction box and electrical system components are grounded to the housing.	. . .
	c. The housing is connected to a ground wire in the power supply.	. . .
	d. Capacitors are located across the rectifier terminals.	. . .
	e. Grommets are inserted in the heat support bracket to isolate heating elements from bracket to prevent metal to metal contact and scraping during expansion and contraction of heating elements.	. . .
	f. Power inlet cover chains are encased in shrinktype tubing to prevent rattling of chain links.	. . .

5-3. EMI CAPACITORS C2 AND C1

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Hot air dryer

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
CAPACITOR C1 REMOVAL	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. Remove evaporator section top cover.	. . .
	c. Remove screws and pull junction box from frame. Use care to avoid breaking the sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is located behind return air louver.
	d. Tag and pull "quick disconnect" terminals from rectifier CR1 terminals 2 and 4.	. . .
	e. Cut leads at terminals.	. . .

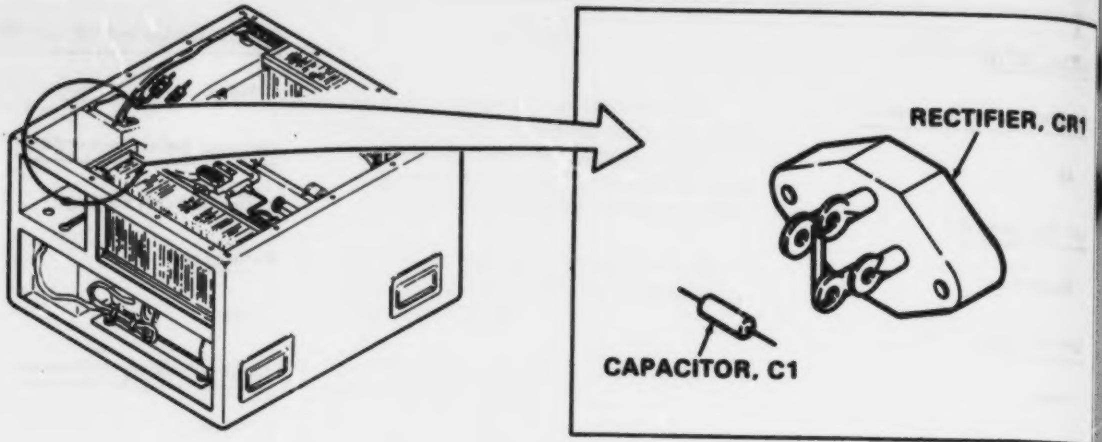
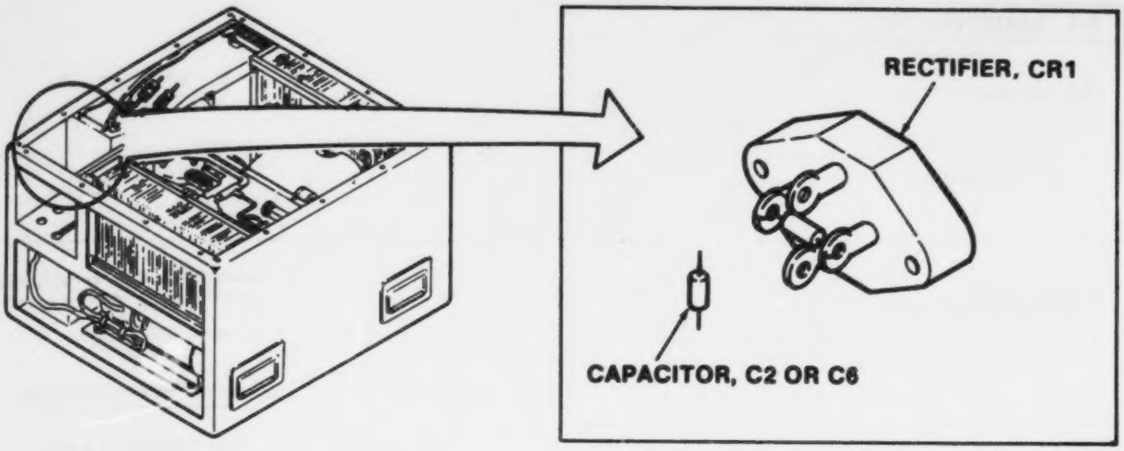


Figure 5-1. Capacitor C1

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. Slip heat shrink tubing over capacitor leads and leads X36A20N and V6D20.	FO-1, FO-3, FO-5, or FO4
	b. Join one capacitor lead and wire V6D20.	. . .
	c. Join second capacitor lead and wire X36A20N.	. . .
	d. Solder "quick disconnect" terminals to the wires.	. . .
	e. Heat shrink tubing over the solder joint.	Use hot air dryer.
	f. Push terminals onto rectifier CR1 terminals 2 and 4.	Wire V6D20 to terminal 2; X36A20N to terminal 4.
	g. Replace junction box.	. . .
	h. Replace top cover	. . .
	i. Connect power supply.	. . .

5-3. CAPACITOR C2 (THREE PHASE UNITS) C6 (SINGLE PHASE UNIT)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Disconnect power supply	WARNING High voltage can kill.
	b. Remove evaporator section top cover.	. . .
	c. Remove screws and pull junction box from frame. Use care to avoid breaking the sensing line.	Sensing line connects TEMPERATURE SELECTO to sensing bulb which is locate behind return air louver.



A01264
TM5-4120-367-14-2

Figure 5-2. Capacitor C2 (Three Phase Units) C6 (Single Phase Unit)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	d. Tag and pull "quick disconnect" terminals from rectifier CR1 terminals 1 and 3.	. . .
	e. Cut leads at terminals.	. . .
INSTALLATION	a. Slip heat shrink tubing over capacitor leads and leads X38A20N and X37A20.	FO-1, FO-3, FO-5, or FO-6.1
	b. Join one capacitor lead and wire X38A20.	. . .
	c. Join second capacitor lead and wire X37A20.	. . .
	d. Solder "quick disconnect" terminals to the wires.	. . .
	e. Heat shrink tubing over the solder joint.	Use hot air dryer.
	f. Push terminals onto rectifier CR1 terminals 1 and 3.	Wire X38A20 to terminal 3; X37A20 to terminal 1.
	g. Replace junction box.	. . .
	h. Replace top cover	. . .
	i. Connect power supply	. . .

5-4. RESISTORS R1

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Ty-rap
Hot air dryer

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

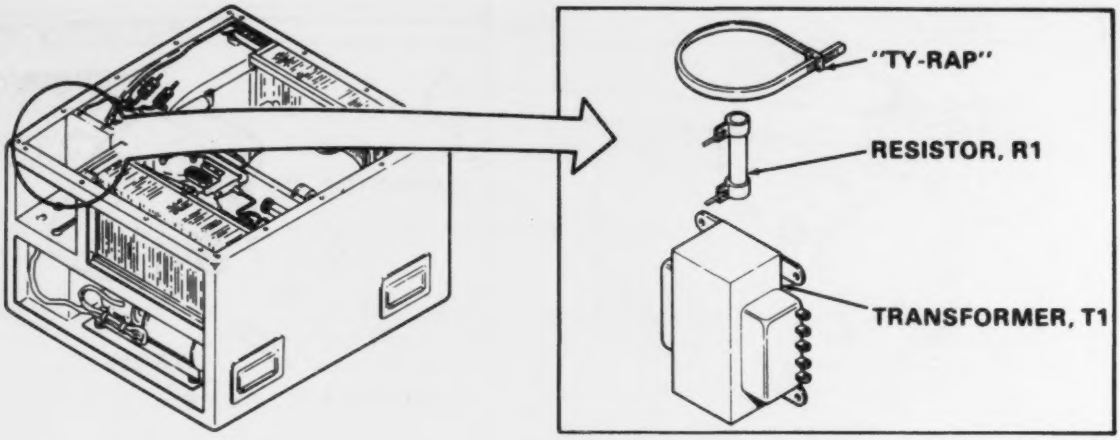
None

Personnel Required

Refrigeration specialists

LOCATION/ITEM	ACTION	REMARKS
RESISTOR R1		
REMOVAL	a. Disconnect power supply from unit.	**WARNING** High voltage can kill.
	b. Remove top cover from evaporator section.	
	c. Remove screws and carefully pull junction box from frame. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is behind return air louver.
	d. Cut "ty-rap" and pull resistor away from transformer.	Figure 5-3.
	e. Tag and unsolder or cut leads at resistor.	

. . .



A01256
TM5-4120-367-14-3

Figure 5-3. Resistor R1

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. Slip heat shrink tubing over resistor leads.	. . .
	b. Use a commercial "butt splice" or solder wire X34A20V (F18H, F18H-3 and F18H-4) or X34A20B (F18H-3A and F18H-4A) to one of the resistor leads.	. . .
	c. Solder loose end of resistor to terminal 1 of transformer T1.	. . .
	d. Heat shrink tubing over wire or solder connections.	Use hot air dryer.
	e. Secure resistor R1 to transformer T1 using "Ty-rap".	. . .
	f. Replace junction box.	. . .
	g. Replace top cover.	. . .
	h. Connect power supply.	. . .

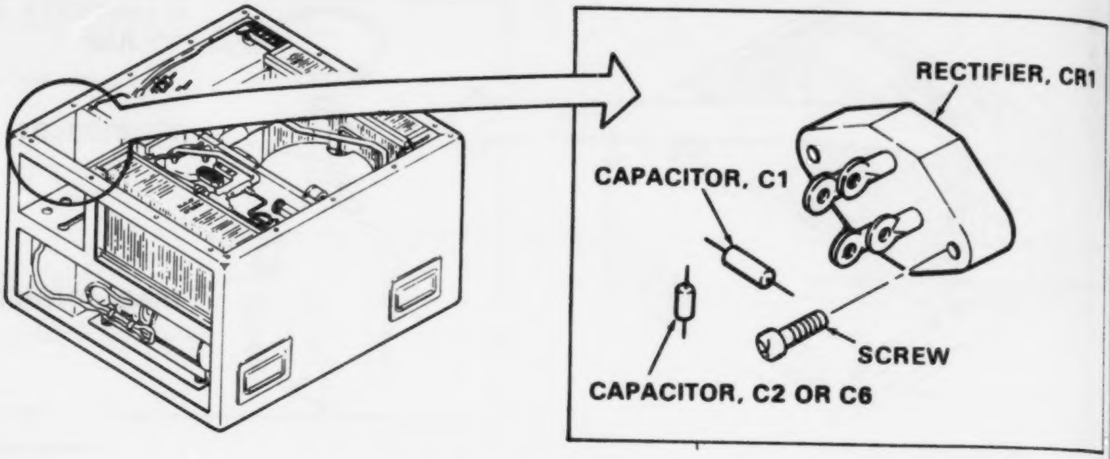

RECTIFIER, CR1
CAPACITOR, C1
SCREW
CAPACITOR, C2 OR C6
A0128
TM5-4120-367-144

Figure 5-4. Rectifier CR1

5-5. RECTIFIER CR1

This task covers:

a. Removal
b. Testing
c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
RECTIFIER CR1		
REMOVAL	a. Disconnect power supply	**WARNING** High voltage can kill.
	b. Remove top cover from evaporator section.	. . .
	c. Remove screws and pull junction box from frame. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing line bulb which is behind return air louver.
	d. Tag and pull the four "quick disconnect" terminals from the rectifier.	. . .
	e. Remove capacitors C1 and C2 or C6.	. . .
	f. Remove two screws and pull rectifier from frame.	. . .
INSTALLATION	a. Bolt rectifier CR1 to frame using two screws.	Terminal no. 1 at top.
	b. Connect "quick disconnect" terminals.	. . .

TERMINAL CONNECTION

WIRE NO.	TERMINAL
X37A20	1
V6D20	2
X38A20	3
X36A20N	4

LOCATION/ITEM	ACTION	REMARKS
	c. Replace capacitors C1 and C2 or C6.	. . .
	d. Install junction box.	. . .
	e. Replace top cover.	. . .
	f. Connect power supply.	. . .

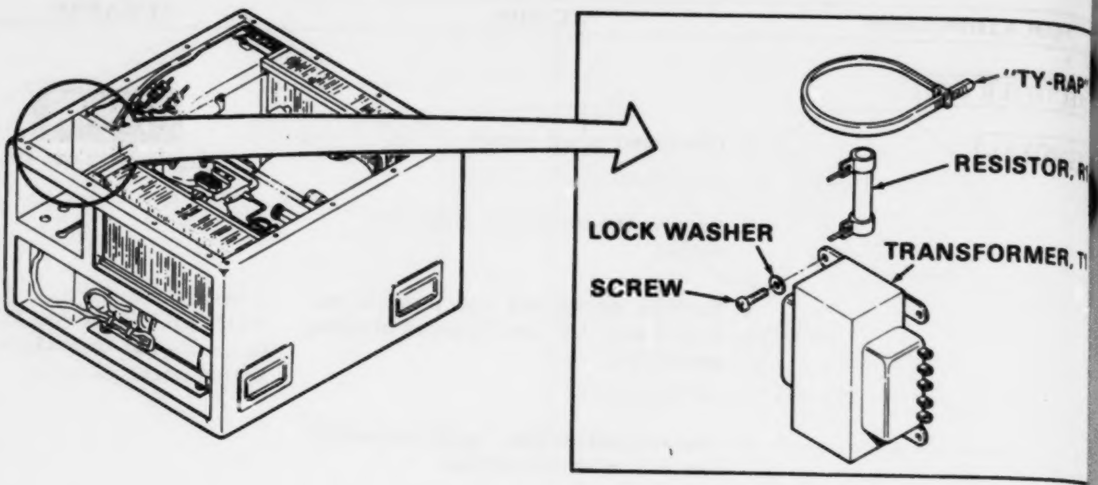

"TY-RAP
RESISTOR, R
LOCK WASHER
TRANSFORMER, T
SCREW
A01
TM5-4120-367-1

Figure 5-5. Transformer T1

5-6. TRANSFORMER T1

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Hot air dryer

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditio

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
TRANSFORMER T1		
REMOVAL	a. Disconnect power supply from unit.	**WARNING** High voltage can kill.
	b. Remove top cover from evaporator section.	
	c. Remove screws and carefully pull junction box from frame. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is behind return air louver.
	d. Remove resistor.	Paragraph 5-4.
	e. Remove four screws and pull transformer away from frame.	. . .
	f. Tag and unsolder or cut the leads at the transformer.	. . .
TESTING	a. Tag and disconnect leads and check for continuity across the primary winding and then across the secondary winding. If either winding is open, replace the transformer.	. . .
	b. Check for shorts between one terminal and transformer case and also between one primary terminal and one secondary terminal using multimeter on high ohms setting. Replace transformer if a short is indicated.	. . .
INSTALLATION	a. Slip heat shrink tubing over the leads.	. . .
	b. Solder leads to transformer.	. . .

TERMINAL CONNECTION F18H, F18H-3 & F18H-4

WIRE NO.	TERMINAL
RESISTOR R1	1
X35A20N	2
X37A20	3
X38A20	4

TERMINAL CONNECTION F18H-3A & F18H-4A

WIRE NO.	TERMINAL
RESISTOR R1	2
X61A16V	3
X61A16V	4
X35A20C	5
X37A20	7
X38A20	8

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	c. Heat shrink tubing over the solder connections.	Use hot air dryer.
	d. Install resistor.	Paragraph 5-4.
	e. Slide transformer into place	. . .
	f. Install screws.	. . .
	g. Replace junction box.	. . .
	h. Replace top cover.	. . .
	i. Connect power supply.	

5-7. RELAY K4

This task covers:

a. Removal
b. Testing
c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter
Stop watch
28VDC power supply

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Solvent PD680
Detergent
Cleaning cloths

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

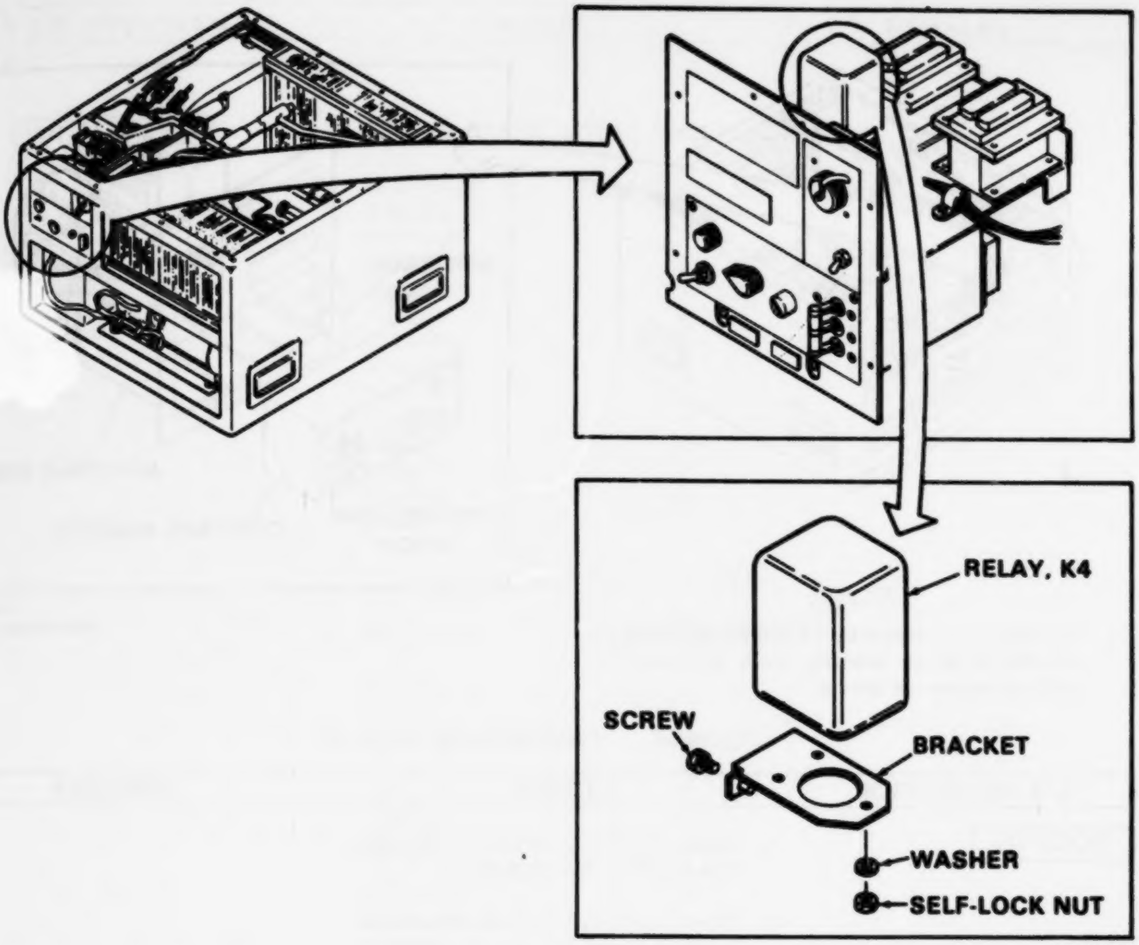
None

Troubleshooting References

None

Personnel Required

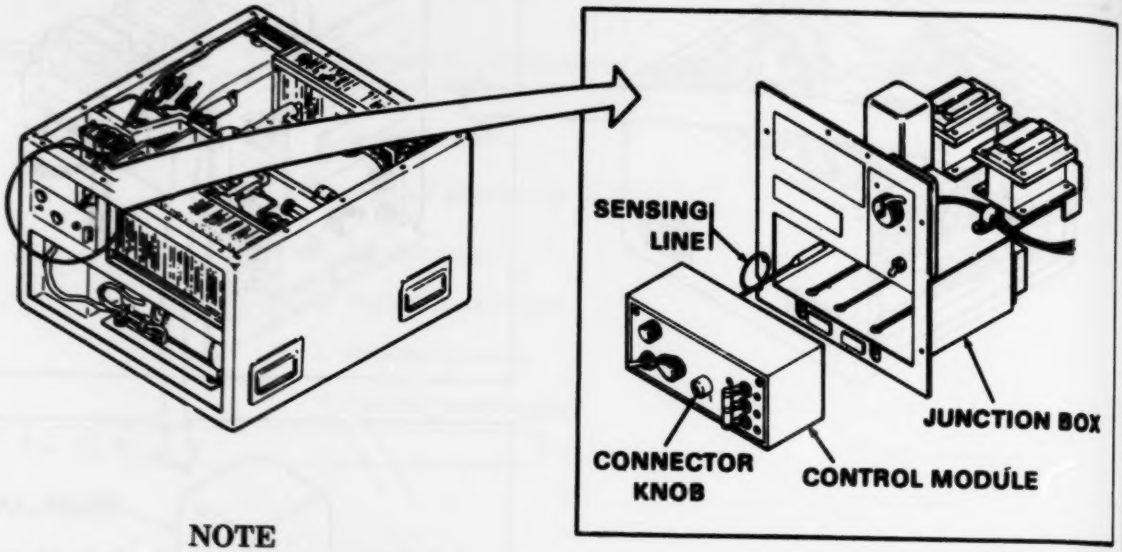
Organizational Maintenance



A01258
TM5-4120-367-14-6

Figure 5-6. Relay K4

LOCATION/ITEM	ACTION	REMARKS
RELAY K4		
REMOVAL	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. Remove screws and carefully pull junction box from the frame. Use care to avoid breaking the sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is behind return air louver.
	c. Remove two screws from the side of the junction box frame.	Bracket and relay can be lifted from frame.
	d. Remove three nuts and washers.	Relay can be lifted from brackets.
	e. Tag and unsolder or cut leads at relay.	. . .



NOTE

Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is behind return air louver.

Figure 5-7. Control Module Removal

LOCATION/ITEM	ACTION	REMARKS
TESTING	a. Apply 28VDC to terminals 2 and 9; 2 is positive, 9 is negative.	...
	b. Check continuity across terminals, 1 and 3; 5 and 11; and 10 and 8.	...
	c. Read Multimeter. It should indicate that terminals 1 and 3; 5 and 11; and 10 and 8 are closed. Terminals 1 and 4; 5 and 6; and 10 and 7 are open.	NOTE Terminals 5, 6, and 11 are not used for Model F18H single phase.
	d. Remove 28VDC power. Multimeter should indicate that terminals 1 and 4, 5 and 6, and 10 and 7 are closed and that terminals 1 and 3, 5 and 11, and 10 and 8 are open.	...
INSTALLATION	a. Slide heat shrink tubing over the leads.	...
	b. Group the leads and pull them thru bracket.	...
	c. Solder leads to relay. See figure FO-1, FO-3, FO-5, or FO-6.1.	NOTE Terminals 5, 6, and 11 are not used for Model F18H.

INSTALLATION

SINGLE PHASE MODEL F18H

WIRE NO.	TERMINAL NO.
X4B16V, X12A16V	1
V9A20	2
X11A16V	3
X6A20V	4
X5B16V, X10A16V	5
Blank	6
X8A20V	7
X9A16V	8
V16A20N	9
X7A16V	10
Blank	11

3 PHASE MODELS F18H-3 & F18H-4

WIRE NO.	TERMINAL NO.
X7B16A	1
V9A20	2
X12A16A	3
X10A20A	4
X6B16B	5
X9A20B	6
X8A20C	7
X11A16C	8
V14A20N, X44A12N	9
X5B16C	10
X13A16B	11

d. Use hot air dryer to heat shrink tubing on or over the solder connections.

e. Push relay down into bracket and install the three nuts and washers.

f. Attach relay and bracket to junction box frame.

g. Replace junction box.

h. Connect power supply.

5-8. RELAY K1

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter
28VDC power supply or
24VDC battery

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Hot air dryer

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

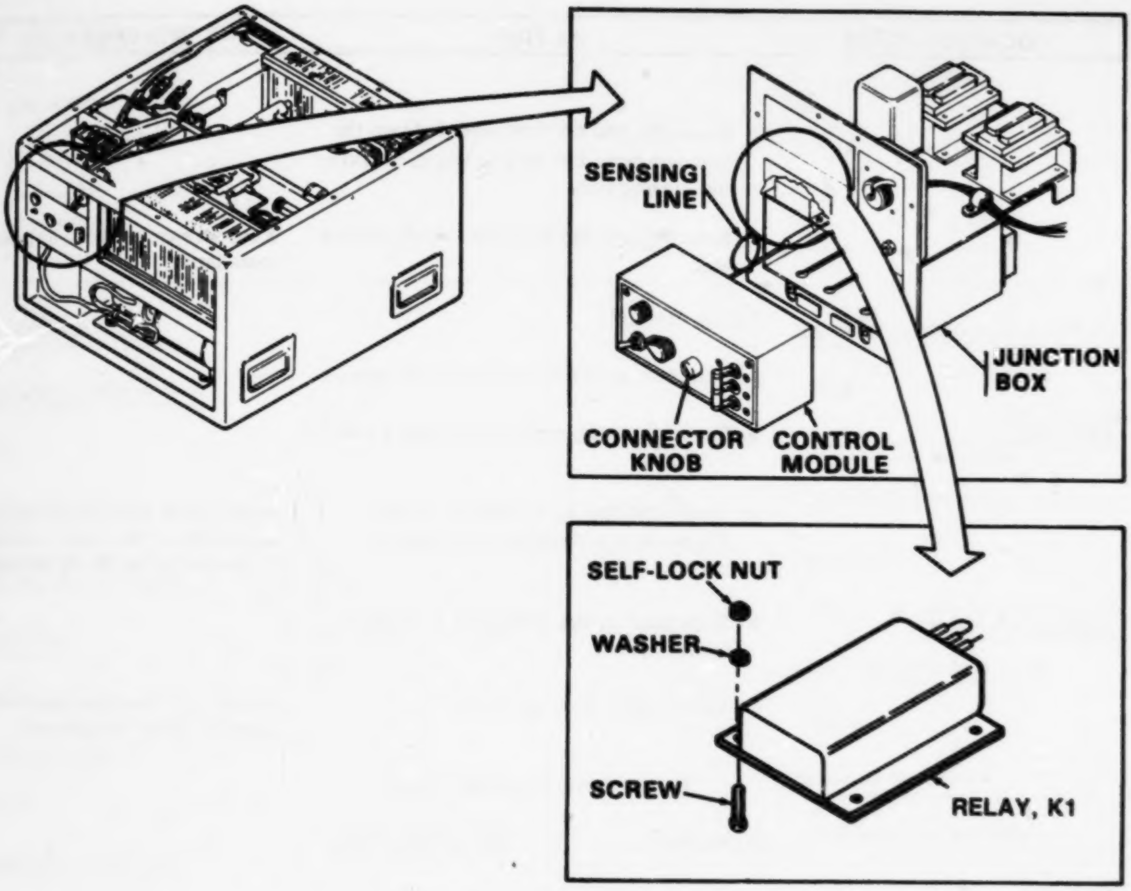
Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
RELAY K1		
REMOVAL	a. Disconnect power supply from the air conditioner.	**WARNING** High voltage can kill.
	b. Remove screws and carefully pull the junction box from the frame. Use care to avoid breaking the sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is behind return air louver.
	c. Use screwdriver to turn control module connector knob to the left until it is free of the frame. (About five complete turns)	. . .


SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE
SELF-LOCK NUT
WASHER
SCREW
RELAY, K1

A01260
TM5-4120-367-14-8

Figure 5-8. Relay K1

LOCATION/ITEM	ACTION	REMARKS
	d. Carefully pull control module from the junction box. Use care to avoid breaking the sensing line.	. . .
	e. Remove four screws from top of junction box.	Keep screws, washers, and nuts for installation.
	f. Cut "ty-rap".	
	g. Unsolder or cut leads at relay terminals.	. . .
TESTING	a. Connect multimeter to terminals 2 and 3.	. . .
	b. Apply 28VDC to terminals 2 and 5; Terminal 1 is positive, 5 is negative.	Multimeter must show continuity across terminals 1 and 3 within 30± 3 seconds of applying voltage.
INSTALLATION	a. Slide heat shrink tubing over leads in control panel.	. . .
	b. Solder leads to relay.	Make sure lead location will not interfere with installation.

TERMINAL CONNECTION

WIRE NO.	TERMINAL NO.
V12A20, V13A20	1
V13A20	2
V7A20	3
V14A20N, V15A20N (Three Phase Only)	5

LOCATION/ITEM	ACTION	REMARKS
	c. Hot air dry heat shrink tubing over the solder connections.	Use hot air dryer.
	d. Push screws up thru the four mounting holes.	Figure 5-6.
	e. Slip relay over the four screws and tighten the screws and nuts.	. . .
	f. Install control module.	. . .
	g. Install junction box.	. . .
	h. Connect power supply.	. . .

5-9. RELAY K2 AND K3

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter
28VDC power supply

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

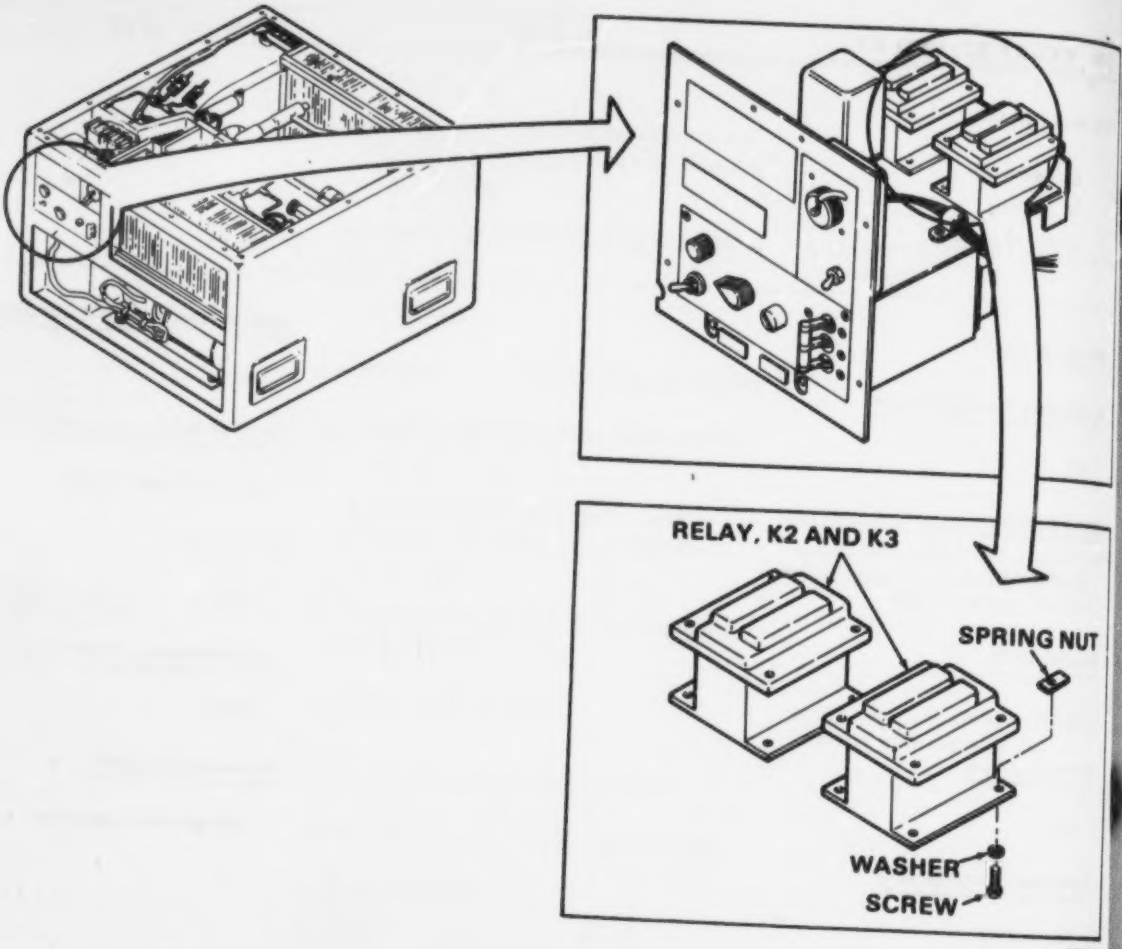
Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
RELAY K2 OR K3 REMOVAL	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. Remove screws and carefully pull junction box from frame. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is behind return air louver.
	c. Remove terminal cover from relay.	Do not discard if relay is not being replaced.
	d. Tag and remove all leads from relay.	
	e. Remove four screws, washers and nuts to lift relay from frame.	Save hardware for reuse.


RELAY, K2 AND K3
SPRING NUT
WASHER
SCREW

A01261
TM5-4120-367-144

Figure 5-9. Relay K2 and K3

LOCATION/ITEM	ACTION	REMARKS
TESTING	a. Apply 28VDC to terminals X1 and X2; X1 is positive, X2 is negative.	. . .
	b. Check continuity across terminals A1 and A2; B1 and B2, and C1 and C2.	The multimeter must show that contacts are closed.
	c. Remove power.	Multimeter must show that contacts are open.
INSTALLATION	a. Attach relay to control panel frame.	Use the removed hardware.
	b. Remove terminal cover to attach leads to new relays.	. . .

MODEL F18H RELAY K2

WIRE NO.	TERMINAL NO.
X1E16V	A1
X2E16V	B1
Blank	C1
V3A20	X1
X32A16V	A2
X17B16V, X31A16V	B2
Blank	C2
V15A20N, V17A20N and V16A20N	X2

MODEL F18H RELAY K3

WIRE NO.	TERMINAL NO.
X19C16Y, X19B12V	A1
X23B12V, X23C16Y	B1
Blank	C1
V8A20, V7A20	X1
X20A12V, X21A12V	A2
X24A12V	B2
Blank	C2
V10A20N, V17A20N, and V18A20N	X2

LOCATION/ITEM	ACTION	REMARKS

INSTALLATION

MODELS FI8H-3 & KIF-18H-4 RELAY K2

WIRE NO.	TERMINAL NO.
X1E16A	A1
X2J20B, X2E16B	B1
X3E16C	C1
V3A20	X1
X39A16A	A2
X60A16B	B2
X59A16C	C2
V15A20N, V16A20N and V17A20N	X2

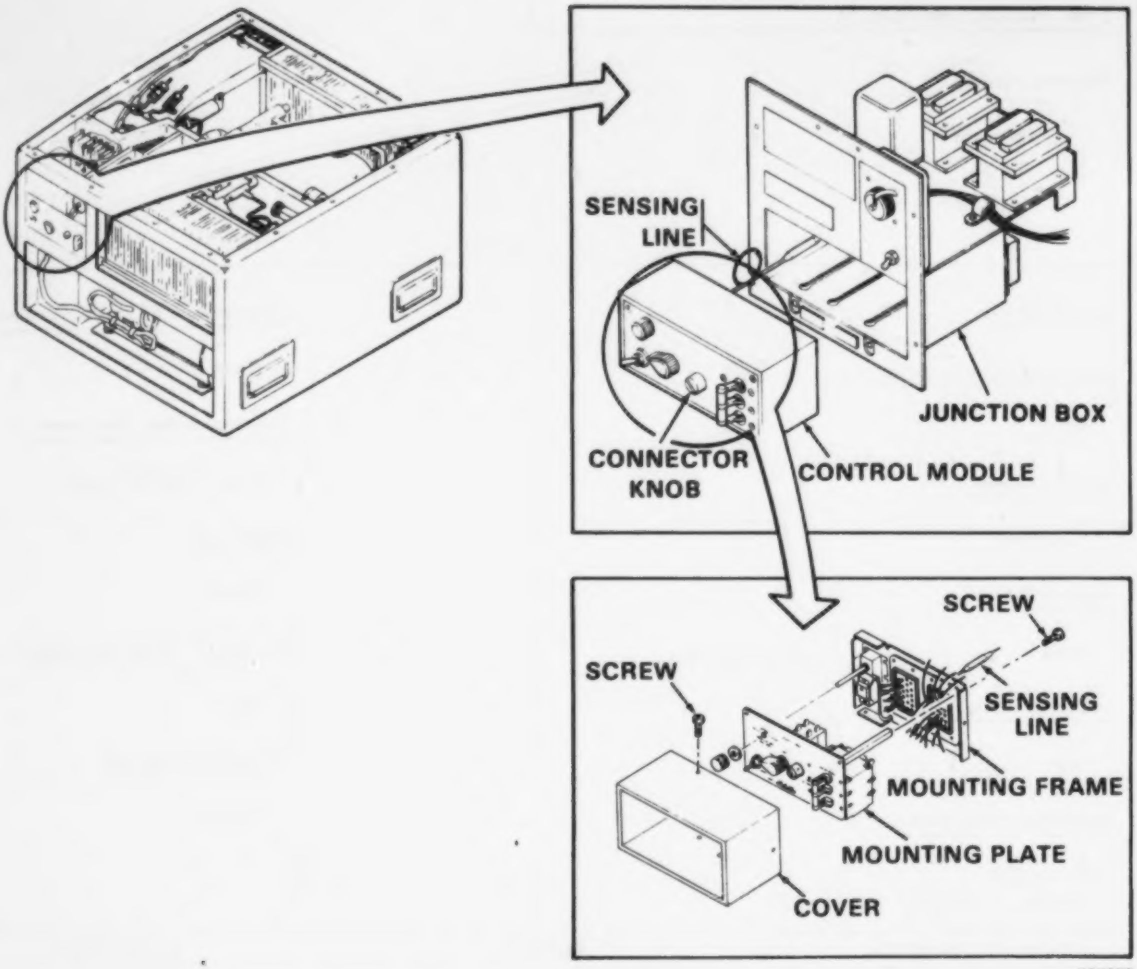
MODELS FI8H-3 & KIF-18H-4 RELAY K3

WIRE NO.	TERMINAL NO.
X20C16B, X20B12A	A1
X22B12B, X22C16B	B1
X24B12C	C1
V7A20, V8A20	X1
X21A12A	A2
X23A12B	B2
X25A12C	C2
V10A20N, V17A20N and V18A20N.	X2

c. Replace terminal cover.

d. Replace junction box.

e. Connect power supply.


SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE
SCREW
SCREW
SENSING LINE
MOUNTING FRAME
MOUNTING PLATE
COVER

A01262
TM5-4120-367-14-10

Figure 5-10. Control Module

5-10. MODE SWITCH S1

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

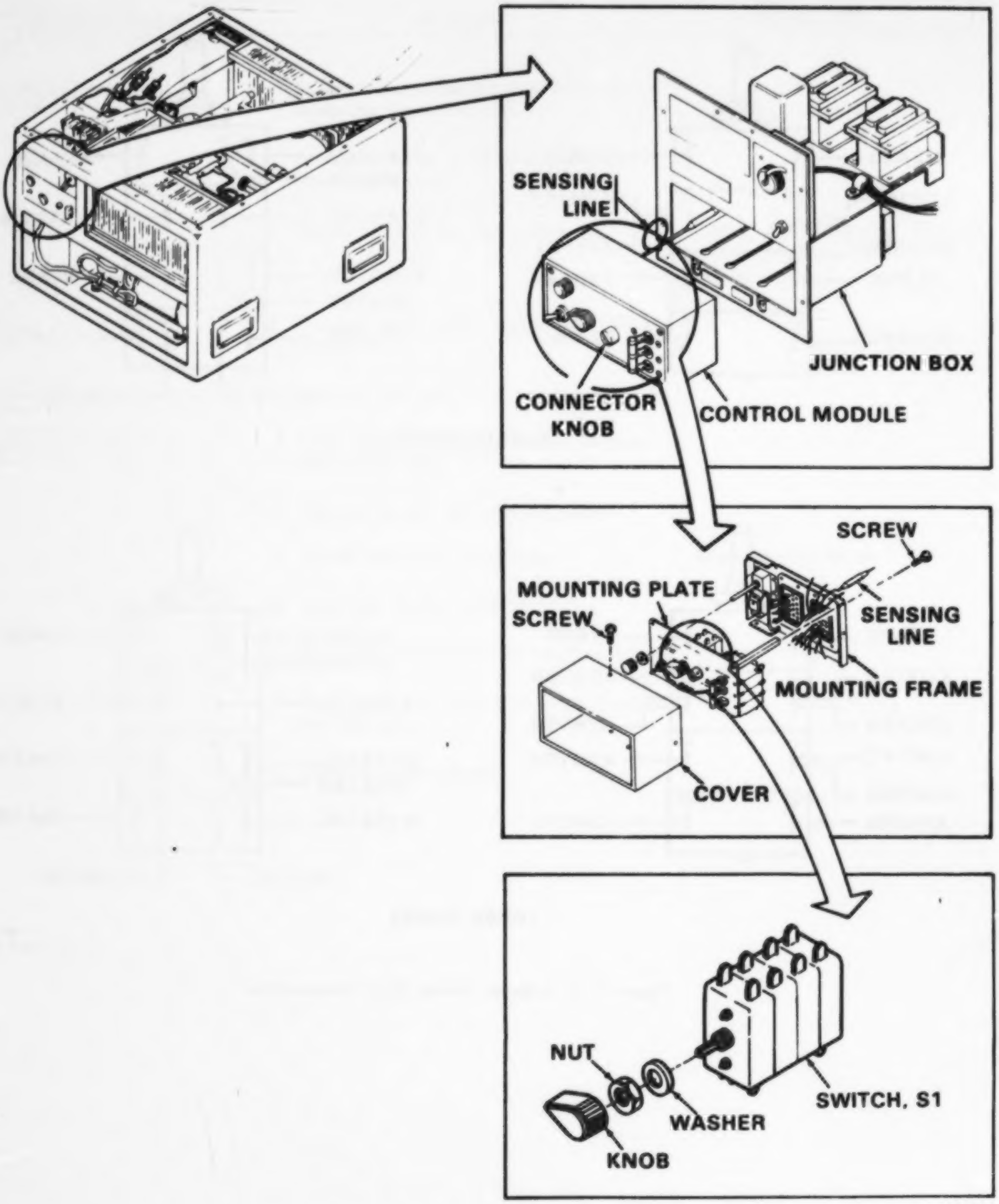
Troubleshooting References

None

Personnel Required

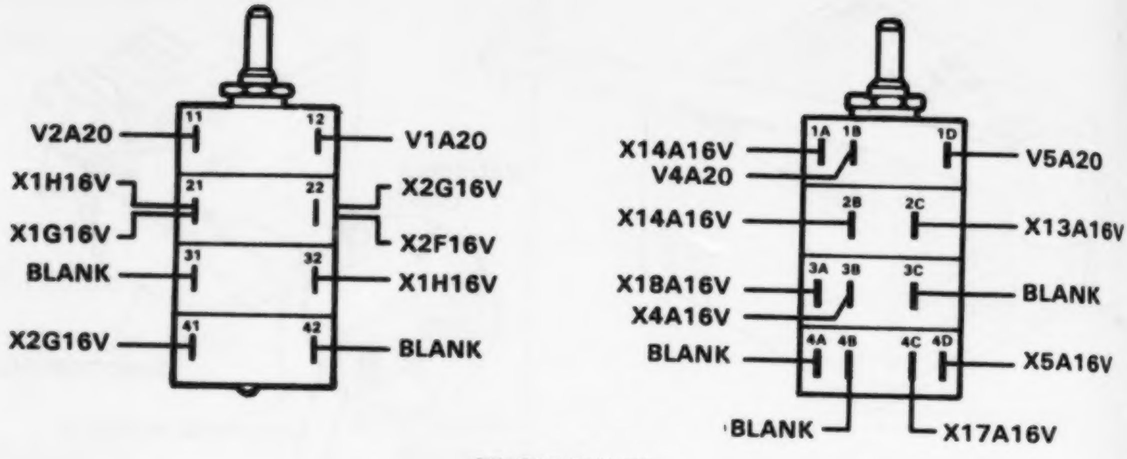
Electrician

LOCATION/ITEM	ACTION	REMARKS
MODE SWITCH REMOVAL	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. Use a screwdriver to turn the connector knob to the left until it is free. (About five complete turns)	
	c. Carefully pull the control module from the junction box. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is behind return air louver. Figure 5-10
	d. Remove four screws and pull cover from control module frame.	

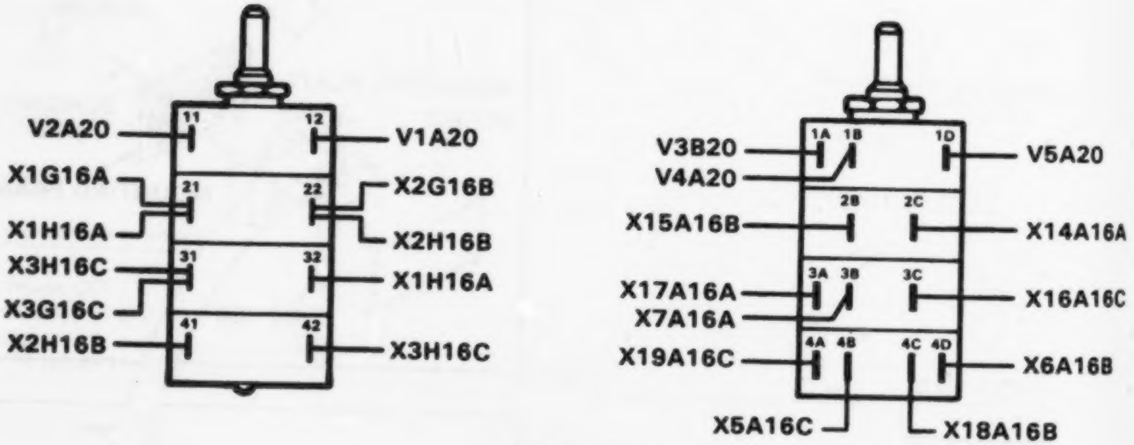

SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE
SCREW
MOUNTING PLATE
SCREW
SENSING LINE
MOUNTING FRAME
COVER
NUT
WASHER
SWITCH, S1
KNOB

A01263
TM5-4120-367-14-11

Figure 5-11. Switch S1


V2A20
X1H16V
X1G16V
BLANK
X2G16V
11
12
21
22
31
32
41
42
V1A20
X2G16V
X2F16V
X1H16V
BLANK
X14A16V
V4A20
X14A16V
X18A16V
X4A16V
BLANK
BLANK
1A
1B
1D
2B
2C
3A
3B
3C
4A
4B
4C
4D
V5A20
X13A16V
BLANK
X5A16V
X17A16V

SINGLE PHASE


V2A20
X1G16A
X1H16A
X3H16C
X3G16C
X2H16B
11
12
21
22
31
32
41
42
V1A20
X2G16B
X2H16B
X1H16A
X3H16C
V3B20
V4A20
X15A16B
X17A16A
X7A16A
X19A16C
X5A16C
1A
1B
1D
2B
2C
3A
3B
3C
4A
4B
4C
4D
V5A20
X14A16A
X16A16C
X6A16B
X18A16B

THREE PHASE

A01264
TM5-4120-367-14-12

Figure 5-12. Selector Switch Wire Termination

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	e. Separate the mounting plate from the mounting frame assembly.	. . .
	f. Loosen setscrew in knob to pull knob from switch shaft.	. . .
	g. Remove switch nut and washer.	Discard nut and washer. New nut and washer included with new switch.
	h. Tag and pull "quick disconnects" from switch	. . .
TESTING	a. See table 4-3, step 7.	. . .
INSTALLATION	a. Push "quick disconnect" terminals onto switch terminals	. . .
	b. Slip switch into the mounting plate.	. . .
	c. Install switch nut and washer.	Supplied with switch
	d. Assemble control module.	. . .
	e. Slide control module into junction box.	. . .
	f. Turn connector knob to the right (About five full turns)	. . .
	g. Connect power supply.	. . .

5-11. TEMPERATURE SWITCH S3

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

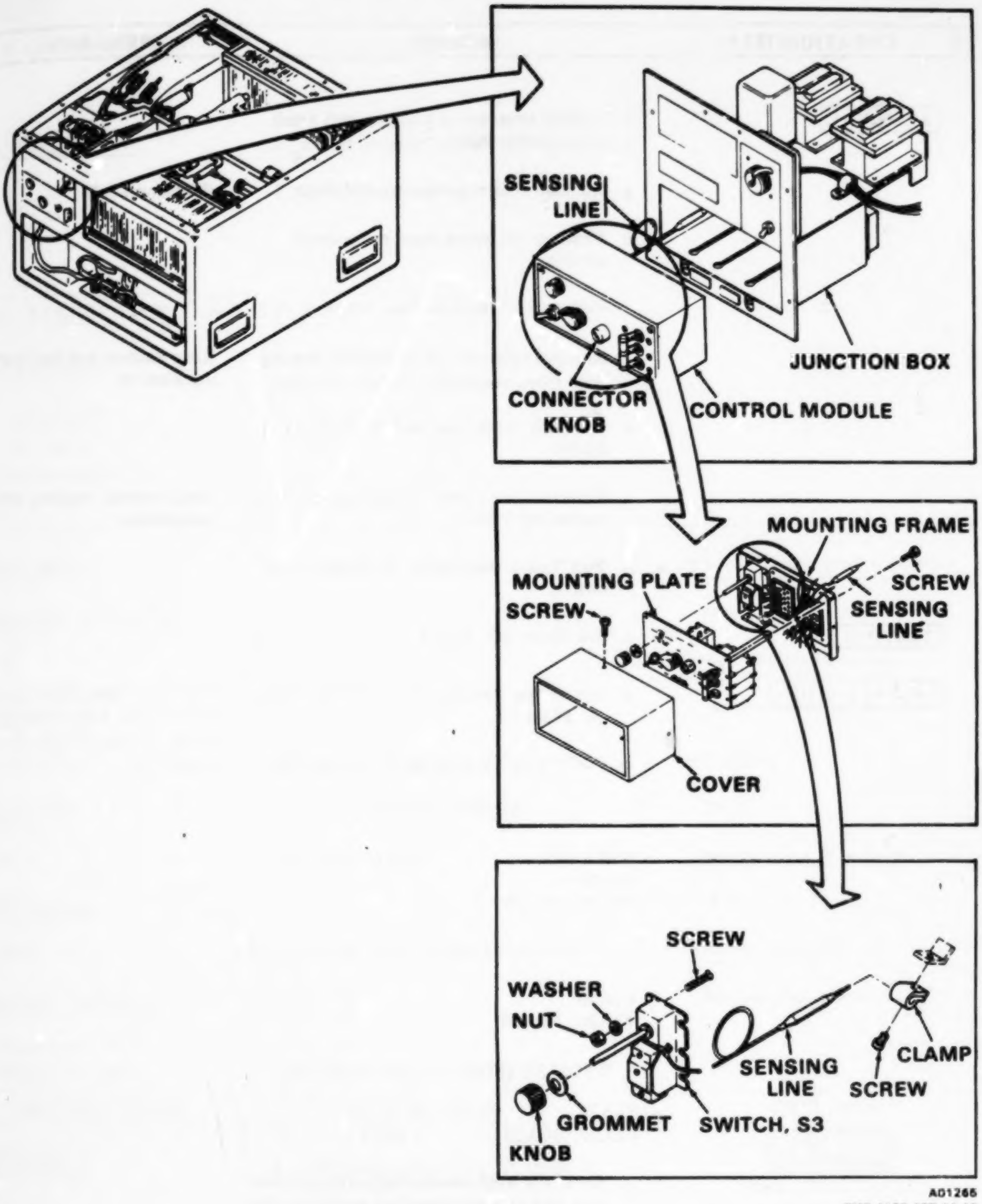
Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
TEMPERATURE SWITCH		
REMOVAL	a. Disconnect power supply from air conditioner	**WARNING** High voltage can kill.
	b. Turn connector knob to the left (about five full turns) until it is free.	. . .
	c. Carefully pull the control module from the junction box. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb.
	d. Remove four screws in order to pull cover from control module frame.	. . .
	e. Remove four screws to separate mounting plate from mounting frame.	. . .


SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE
MOUNTING FRAME
MOUNTING PLATE
SCREW
SCREW
SENSING LINE
COVER
SCREW
WASHER
NUT
SENSING LINE
CLAMP
SCREW
GROMMET
SWITCH, S3
KNOB

A01265
TM5-4120-367-14-13

Figure 5-13. Temperature Selector Switch S3

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	f. Loosen setscrew in knob to pull knob from switch shaft.	. . .
	g. Remove return air louver and filter.	Paragraph 5-19
	h. Remove top cover from evaporator section.	
	i. Pull control module from frame.	. . .
	j. Remove tube clamps to remove sensing bulb from evaporator blower housing.	Keep clamps and hardware for installation.
	k. Carefully work tube and bulb from frame.	. . .
	l. Remove four screws to pull switch from mounting frame.	Keep screws, washers, nuts, for installation.
	m. Pull "quick disconnect" terminals from switch.	. . .
TESTING	a. See Table 4-[illegible]. Step 8	. . .
INSTALLATION	a. See wiring diagram FO-1, FO-3, FO-5 or FO-6.1.	FO-1 for F18H, FO-3 for F18H FO-5 for KIF-18H-4, FO-6.1 for F18H-3A and F18H-4A.
	b. Push "quick disconnects" onto switch.	

SINGLE PHASE

WIRE NO.	TERMINAL NO.
V1A20	1
V2A20, V6A20	2

3 PHASE (F18H-3 and KIF-18H-4)

V1A20	2
V2A20, V6A20	1

3 PHASE (F18H-3A and F18H-4A)

V1A20	3 BLUE
V2A20, V6A20	1 RED

	c. Carefully work sensing bulb thru junction box and control/electrical section to the evaporator blower housing.	. . .
	d. Clamp sensing bulb to the evaporator blower housing bracket.	. . .
	e. Secure switch to mounting frame.	. . .
	f. Assemble control module.	. . .
	g. Install louver, filter, and top panel.	

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	h. Install control module in junction box.	. . .
	i. Install junction box.	. . .
	j. Connect power supply.	. . .

5-12. EVAPORATOR FAN SWITCH S2.

This task covers:

a. Removal
b. Testing
c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

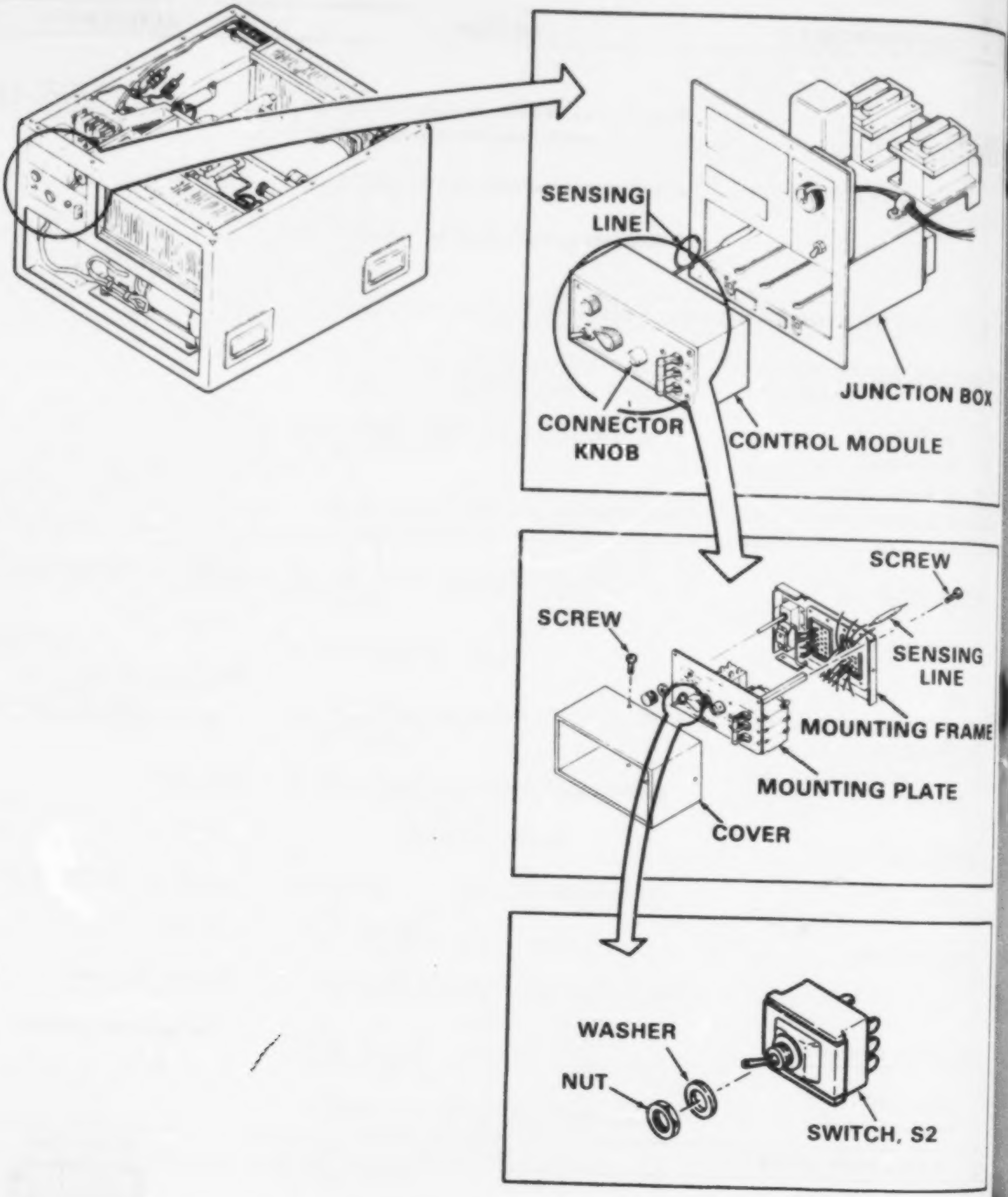
Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Disconnect power supply from air conditioner.	**WARNING** High voltage can kill.
	b. Turn connector knob to the left (about five full turns) until it is free.	
	c. Carefully pull control module from junction box. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb.


SENSING LINE
JUNCTION BOX
CONNECTOR KNOB
CONTROL MODULE
SCREW
SCREW
SENSING LINE
MOUNTING FRAME
MOUNTING PLATE
COVER
WASHER
NUT
SWITCH, S2

TM5-4120-367-14-14

Figure 5-14. Fan Speed Switch S2

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	d. Remove four screws in order to pull cover from mounting frame.	. . .
	e. Remove four screws to separate mounting plate from mounting frame.	. . .
	f. Remove switch nut and washer to pull switch from mounting plate.	If switch is to be replaced, discard nut and washer. Supplied with new switch.
	g. Tag and pull "quick disconnects" from switch terminals.	. . .
TESTING	a. Check continuity in both positions. Continuity should be indicated.	. . .
INSTALLATION	a. See figure FO-1, FO-3, FO-5, or FO-6.1.	FO-1 for F18H, FO-3 for F18H-3, FO-5 for KIF-18H-4, FO-6.1 for F18H-3A and F18H-4A.
	b. Push "quick disconnect" terminals onto switch.	

SINGLE PHASE MODEL F18H

WIRE NO.	TERMINAL NO.
X25A16V	A1
X26A16V	B1
Blank	C1
X13A16V, X15A16V	A2
X16A16V	B2
Blank	C2
X27A20V	A3
X28A20V	B3
Blank	C3

3 PHASE (F18H-3 and KIF-18H-4)

WIRE NO.	TERMINAL NO.
X26A16A	A1
X28A16B	B1
X27A17C	C1
X14A16A	A2
X15A16B	B2
X16A16C	C2
X29A18A	A3
X31A18B	B3
X30A18C	C3

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	c. Slide switch into mounting plate assembly.	. . .
	d. Thread nut and washer onto switch shaft.	. . .
	e. Assemble control module.	. . .
	f. Install control module into junction box.	. . .
	g. Tighten connector knob.	. . .
	h. Connect power supply.	. . .

5-13. CONTROL CIRCUIT BREAKER CB2.

This task covers:

a. Removal
b. Testing
c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

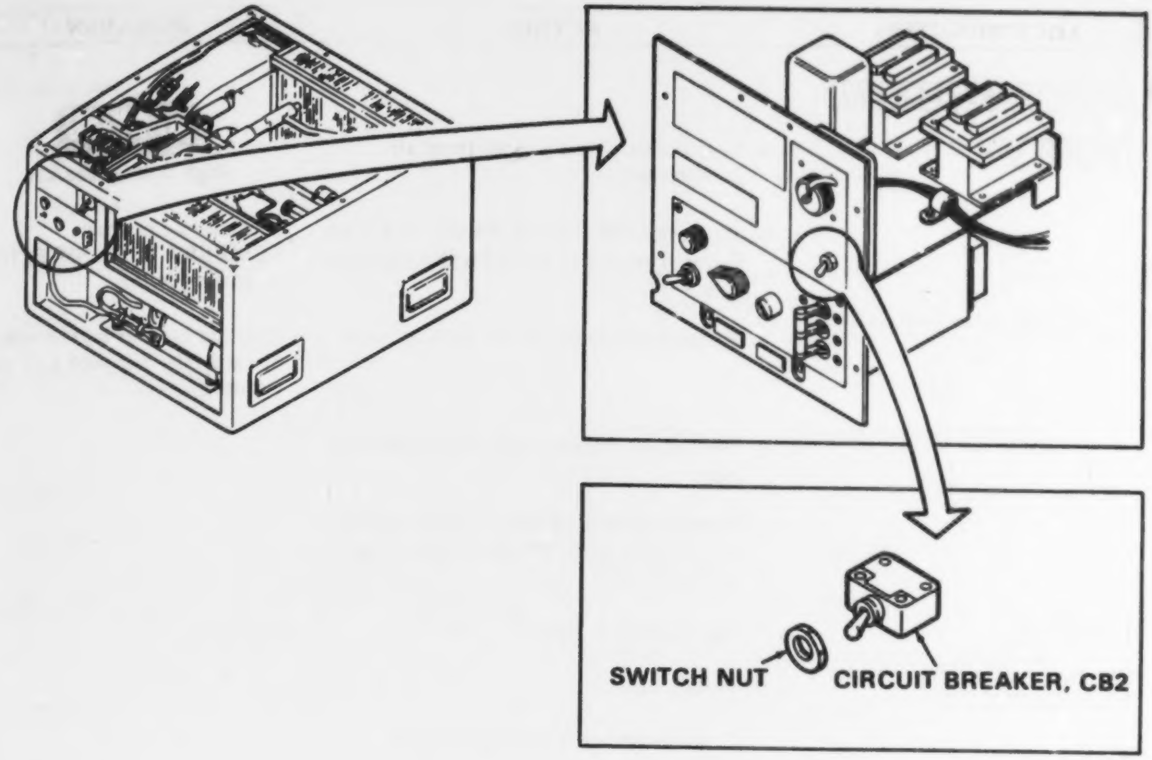
None

Troubleshooting References

None

Personnel Required

Refrigeration specialist


SWITCH NUT
CIRCUIT BREAKER, CB2

A01287
TM5-4120-367-14-15

Figure 5-15. Circuit Breaker CB2

LOCATION/ITEM	ACTION	REMARKS
CIRCUIT BREAKER CB2		
REMOVAL	a. Disconnect power supply from air conditioner.	**WARNING** High voltage can kill.
	b. Remove screws to pull junction box from frame. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb.
	c. Remove nut from circuit breaker shaft.	If circuit breaker is to be replaced discard nut. Supplied with new circuit breaker.
	d. Pull circuit breaker away from junction box.	. . .
	e. Remove circuit breaker terminal screws to lift wires from circuit breaker. Tag removed wires.	. . .
TESTING	See Table 4-3, step 1	
INSTALLATION	a. Install wires:	. . .

TERMINAL CONNECTIONS

SINGLE PHASE MODEL F18H

WIRE NO.	TERMINAL
X29B20V	1
X1F20V	2

3 PHASE MODELS F18H-3 AND F18H-4

WIRE NO.	TERMINAL
X2J20B	1
X32A20B	2

	b. Install circuit breaker in junction box.	Locating dimple provided for correct installation.
	c. Thread nut onto circuit breaker shaft.	. . .
	d. Install junction box.	. . .
	e. Connect power supply.	. . .

5-14. CIRCUIT BREAKER CB1

This task covers:

a. Removal
b. Testing
c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

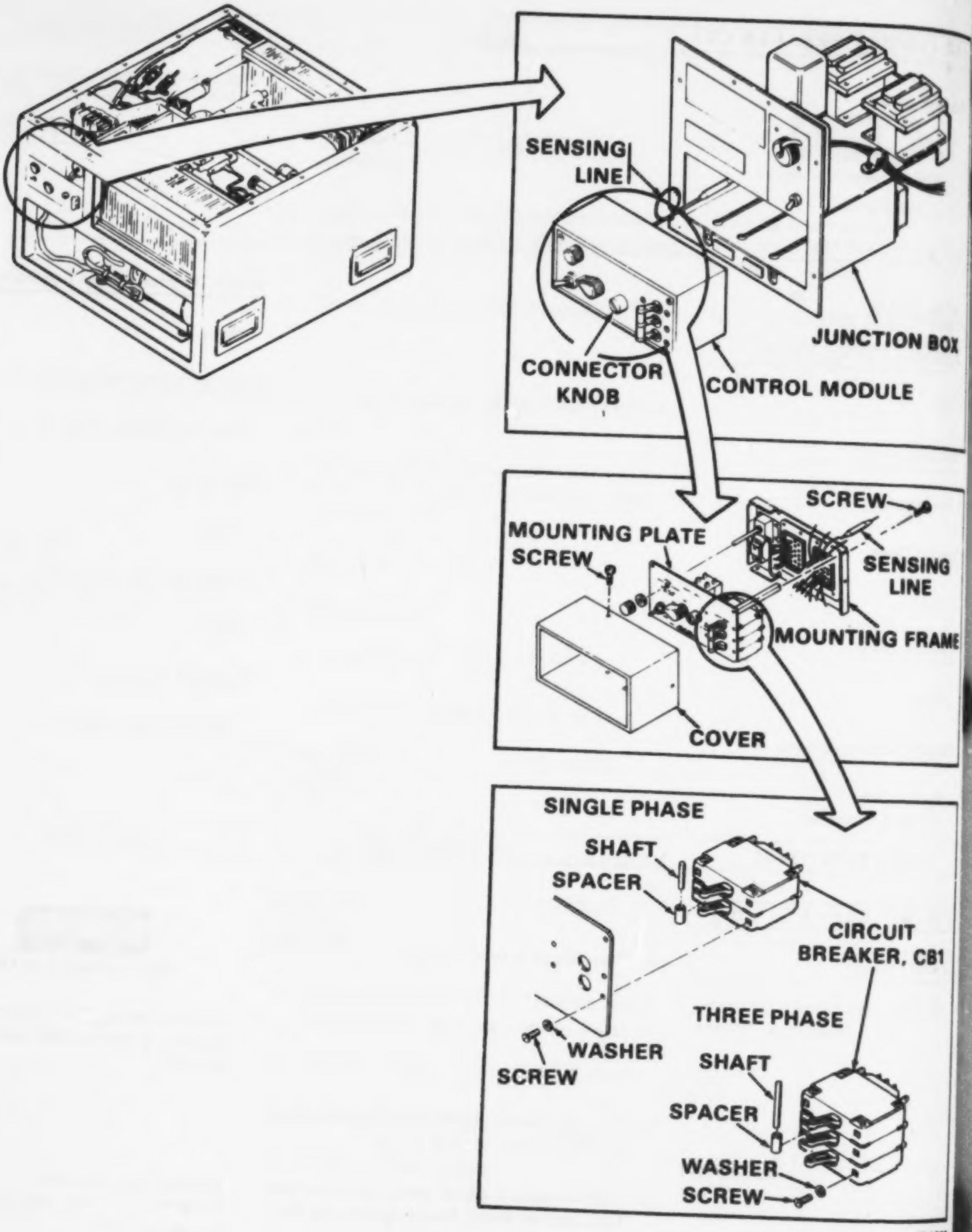
Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
CIRCUIT BREAKER CB1		
REMOVAL	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. Drive out handle shaft and spacers.	If circuit breaker is to be replaced, discard. Supplied with new circuit breaker.
	c. Turn connector knob to the left (about five full turns) until it is free.	
	d. Pull control module from junction box. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb.


SENSING LINE
CONNECTOR KNOB
CONTROL MODULE
JUNCTION BOX
SCREW
MOUNTING PLATE
SCREW
SENSING LINE
MOUNTING FRAME
COVER
SINGLE PHASE
SHAFT
SPACER
CIRCUIT BREAKER, CB1
WASHER
SCREW
THREE PHASE
SHAFT
SPACER
WASHER
SCREW

A0128
TM5-4120-367-14-1

Figure 5-16. Circuit Breaker CB1

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	e. Remove four screws to pull cover from control module.	. . .
	f. Remove four screws to separate mounting frame assembly.	. . .
	g. Tag and pull "quick disconnect" terminals from circuit breaker.	. . .
	h. Remove four screws (single phase) or six screws (3 phase) to pull circuit breaker from mounting plate.	. . .
TESTING	a. See Table 4-3, step 1.	. . .
INSTALLATION	a. See figure FO-1, FO-3, FO-5, or FO-6.1.	. . .
	b. Push "quick disconnect" terminals onto circuit breaker.	. . .

Single Phase Model F18H

WIRE NO.	TERMINAL
X30A20V	NO
X29A20V	C
X1D12V	A1
X2D12V	B1
X19A12V	A2
X23A12V	B2

3 Phase Models F18H-3 & F18H-4

WIRE NO.	TERMINAL
X57A20B	NO
X33B20B	C
X1D12A	A1
X2D12B	B1
X3D12C	C1
X20A12A	A2
X22A12B	B2
X24A12C	C2

LOCATION/ITEM	ACTION	REMARKS
	c. Drive out shaft and handle spacers.	Save for step e.
	d. Secure circuit breaker to mounting frame. Four screws (single phase), six screws (3 phase).	Terminals A1, B1, C1, to outside of frame.
	e. Install handle spacers and shaft.	Removed in step c.
	f. Assemble control module.	. . .
	g. Install control module into junction box.	. . .
	h. Connect power supply.	. . .

5-15. CONNECTOR P2

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Cleaning Cloths
Hot air dryer

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

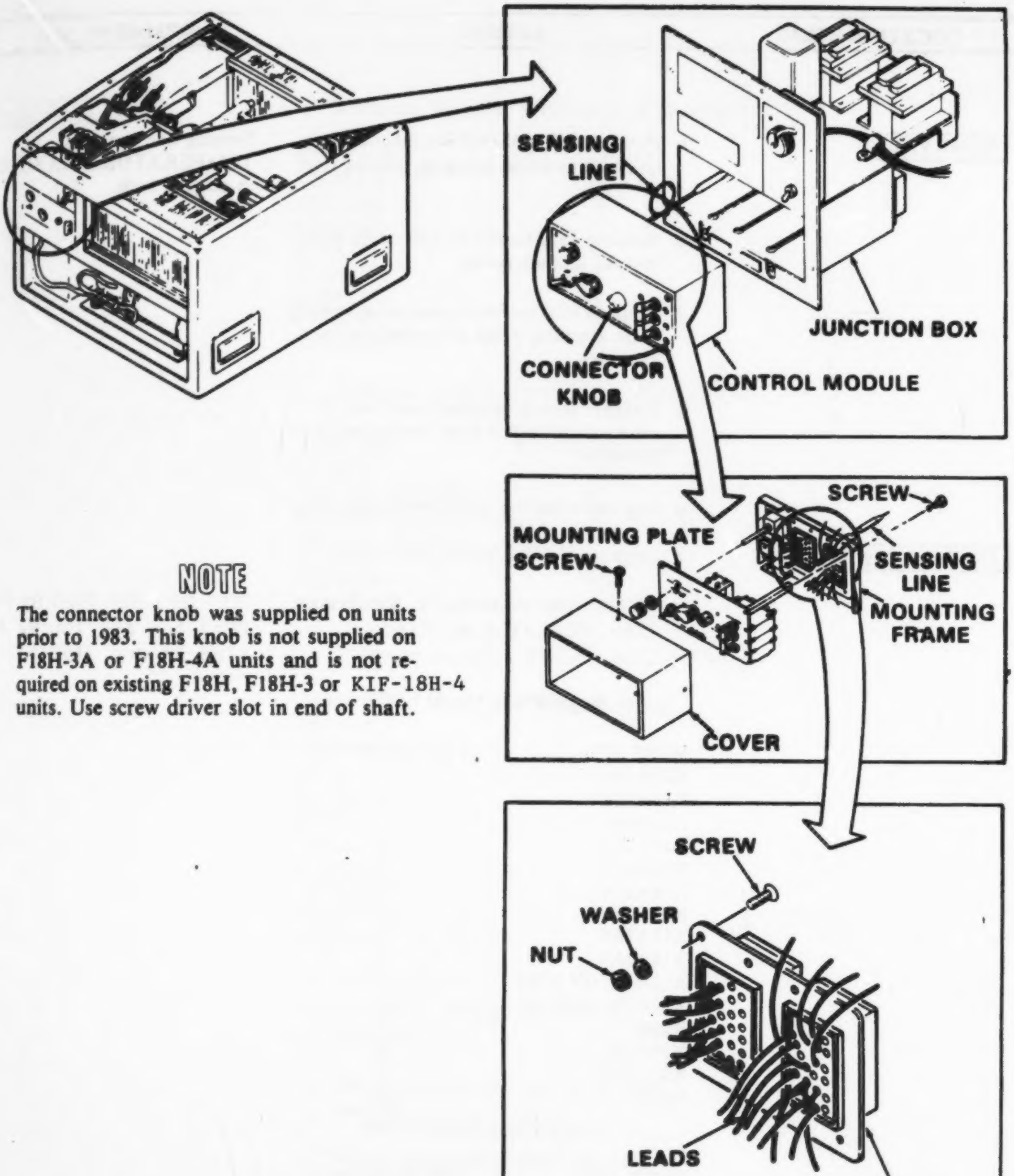
Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
CONNECTOR P2		
REMOVAL	a. Disconnect power supply from air conditioner.	**WARNING** High voltage can kill. **NOTE** Connector is "two gang" connector. Figures FO-1, FO-3, FO-5, and FO-6.1 label as P2A and P2B.
	b. Turn connector knob to the left (about five full turns) until it is free.	. . .


SENSING LINE
CONNECTOR KNOB
CONTROL MODULE
JUNCTION BOX
SCREW
MOUNTING PLATE
SCREW
SENSING LINE
MOUNTING FRAME
COVER
SCREW
WASHER
NUT
LEADS
CONNECTOR, P2

NOTE

The connector knob was supplied on units prior to 1983. This knob is not supplied on F18H-3A or F18H-4A units and is not required on existing F18H, F18H-3 or KIF-18H-4 units. Use screw driver slot in end of shaft.

A01289
TM5-4120-367-14-17

Figure 5-17. Connector P2

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	c. Pull control module from junction box. Use care to avoid breaking sensing line.	Sensing line connects TEMPERATURE SELECTOR to sensing bulb.
	d. Remove four screws to pull cover from control module frame.	. . .
	e. Remove four screws to separate mounting plate assembly from mounting frame assembly.	. . .
	f. Remove screws, washers, and nuts to separate connector from mounting frame assembly.	. . .
	g. Tag and unsolder wires from connector.	. . .
INSTALLATION	a. Slide heat shrink tubing over wires.	. . .
	b. Solder wires to connector. See figure FO-1, FO-3, FO-5, or FO-6.1.	FO-1 for F18H. FO-3 for F18H FO-5 for KIF-18H-4, FO-6 F18H-3A and F18H-4A.

Single Phase Model F18H

WIRE NO.	P2A TERMINAL
X25A16V	1
X26A16V	2
X14A16V	3
X27A20V	4
X28A20V	5
X16A16V	6
X15A16V	7
X17A16V	8
X18A16V	9
X1D12V, X1G16V	11
X2D12V, X2F16V	12
Blank	13
X19A12V	14
X23A12V	15
Blank	16

Single Phase Model F18H

WIRE NO.	P2B TERMINAL
X4A16V	1
X5A16V	2
V5A20	3
V4A20	4
V3B20	5
Blank	6
X29A20V	7
X30A20V	8
V6A20	10
X3D16N	11

LOCATION/ITEM	ACTION	REMARKS

INSTALLATION

3 Phase Models F18H-3 & KIF-18H-4

WIRE NO.	P2A TERMINAL
X26A16A	1
X28A16B	2
X27A16C	3
X29A18A	4
X31A18B	5
X20A18C	6
X17A16A	7
X18A16B	8

3 Phase Models F18H-3 & KIF-18H-4

WIRE NO.	P2A TERMINAL
X19A16C	9
X1D12A, X1G16A	11
X2D12B, X2G16B	12
X3D12C, X3G16C	13
X20A12A	14
X22A12B	15
X24A12C	16

3 Phase Models F18H-3 & KIF-18H-4

WIRE NO.	P2B TERMINAL
X5A16C	1
X6A16B	2
V5A20	3
V4A20	4
V3B20	5
X7A16A	6
X33B20B	7
X57A20B	8
V6A20	10
X4D16N	11

ACTION	REMARKS
c. Heat shrink tubing over soldered connections.	. . .
d. Slide connector into mounting plate assembly.	. . .
e. Secure to mounting plate assembly.	. . .
f. Assemble control module.	. . .
g. Install control module.	. . .
h. Connect power supply.	. . .

5-16. CAPACITORS (SINGLE PHASE) C2, C3, C5

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

Model F18H Single Phase

Test Equipment

None

Special Tools

None

Materials/Parts

Grounding Rod

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

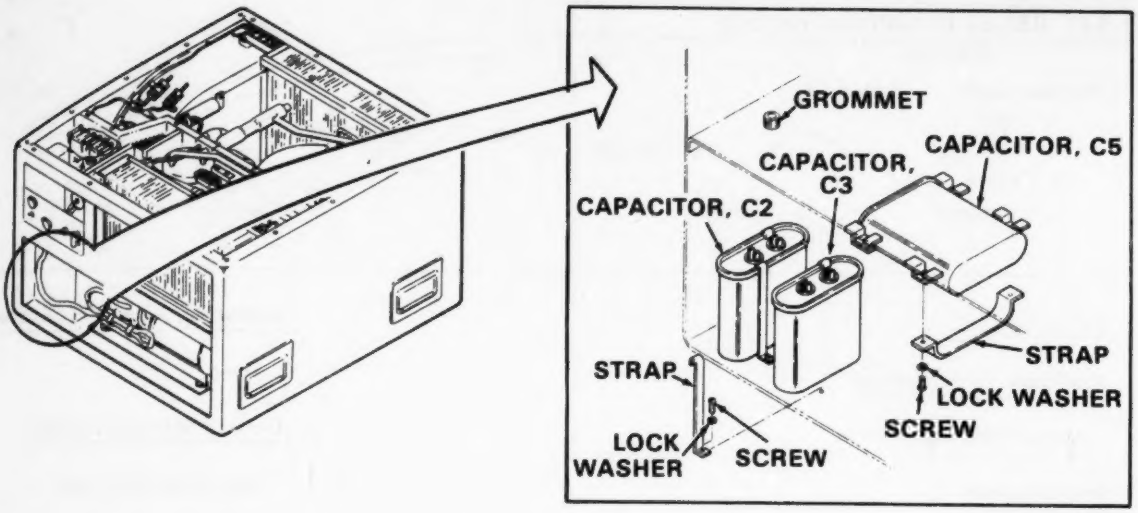
Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Disconnect power supply from air conditioner.	**WARNING** High voltage can kill.
	b. Remove evaporator air inlet and filter.	. . .
	c. Ground the capacitors to discharge electrical charge.	Use grounding rod.
	d. Tag and pull "quick disconnect" terminal from capacitor.	. . .
	e. Remove screws, washers, and straps.	Capacitor can be pulled from frame.


GROMMET
CAPACITOR, C5
CAPACITOR, C3
CAPACITOR, C2
STRAP
STRAP
LOCK WASHER
SCREW
LOCK WASHER
SCREW

A01270
TM5-4120-367-14-18

Figure 5-18. Capacitor C2, C3, and C5 (Single Phase)

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. See wiring diagram FO-1.	. . .
	b. Push "quick disconnect" terminals onto capacitor terminals.	. . .

CAPACITOR C2

WIRE NO.	TERMINAL
X12A16V	1
X7A16V	2

CAPACITOR C3

WIRE NO.	TERMINAL
X16B16V	1
X15B16V	2

CAPACITOR C5

WIRE NO.	TERMINAL
X21A12V	1
X22A12V	2

LOCATION/ITEM	ACTION	REMARKS
	c. Secure capacitor in place.	. . .
	d. Replace air filter and louver.	. . .
	e. Connect power supply.	. . .

5-17. RELAY K5 (SINGLE PHASE)

This task covers:

a. Removal
b. Testing
c. Installation

INITIAL SETUP

Applicable Configurations

Model F18H Single Phase

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

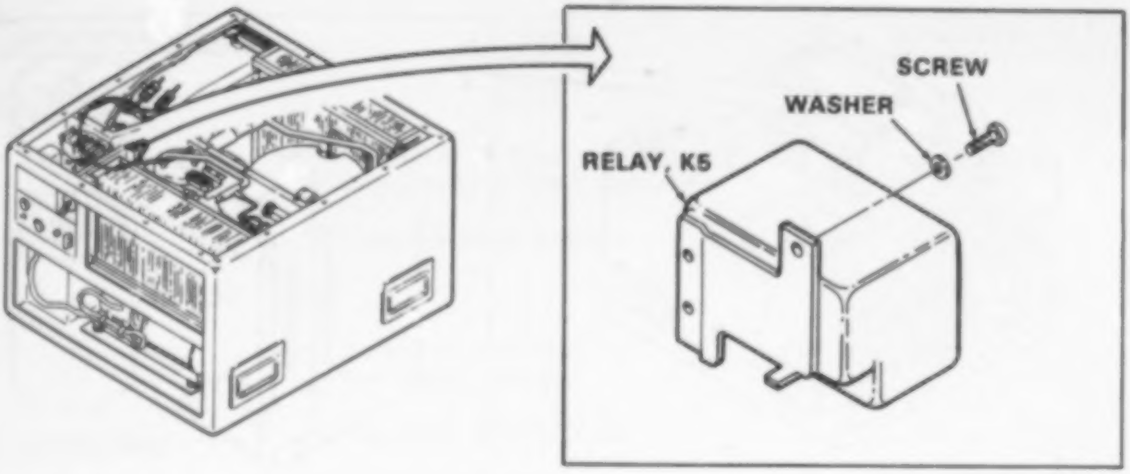
Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
RELAY K5		
	NOTE Air Conditioner will have to be removed from installed position to replace relay K5.	
REMOVAL	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. Remove air conditioner from installed position.	Paragraph 3-5.
	c. Remove all three top covers.	. . .
	d. Tag and pull "quick disconnect" terminals from relay.	. . .
	e. Remove screws and washer to lift relay from frame.	Save hardware for installation.



A01271
TM5-4120-367-14-19

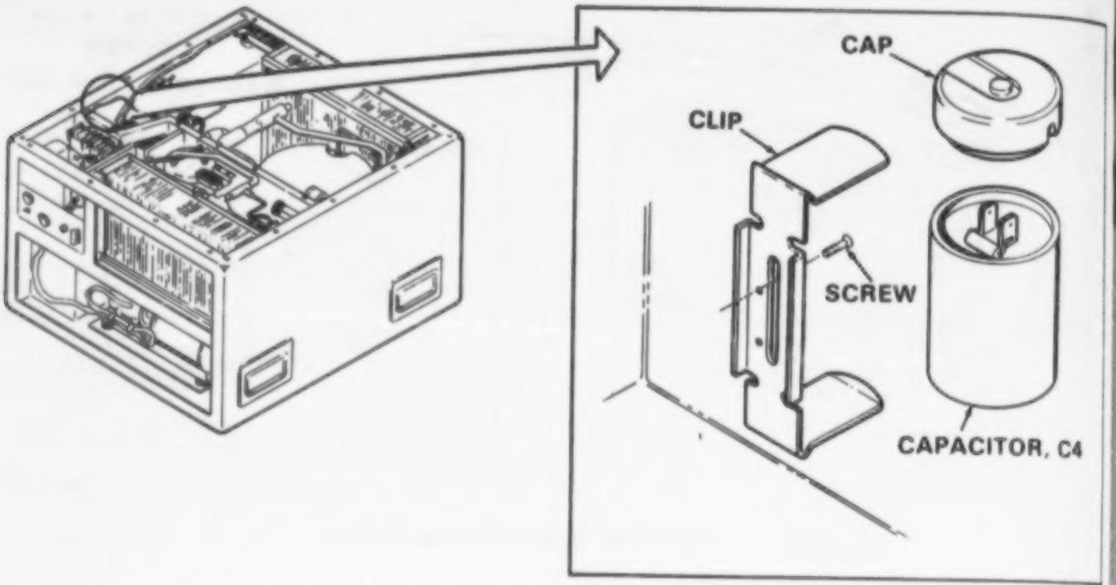
Figure 5-19. Relay K5 (Single Phase)

LOCATION/ITEM	ACTION	REMARKS
TESTING	See Table 4-3, step 11.	. . .
INSTALLATION	a. Bolt relay to frame using removed screws and washers.	. . .
	b. Push "quick disconnect" terminals onto relay terminals.	. . .

TERMINAL CONNECTIONS

WIRE NO.	TERMINAL
X52A16V	1
X22B12V, X48A12V	2
X20B12V, X49A12V	4
X50A16V	
X24B12V, X47A12V	5

	c. Replace top three covers.	. . .
	d. Install air conditioner.	Paragraph 3-5.



A01272
TM5-4120-367-14(2)

Figure 5-20. Capacitor C4 (Single Phase)

5-18. CAPACITOR C4 (SINGLE PHASE)

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

Model F18H, Single Phase

Test Equipment

None

Special Tools

None

Materials/Parts

Grounding Rod

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
CAPACITOR C4	**NOTE** Air conditioner will have to be removed from installed position to replace capacitor C4.	
REMOVAL	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. Remove air conditioner from installed position.	Paragraph 3-5.
	c. Remove all three top covers.	. . .
	d. Pry cap from capacitor	. . .
	e. Ground capacitor to discharge electrical charge.	Use grounding rod.
	f. Tag and pull "quick disconnect" terminals from capacitor.	
	g. Pull capacitor from retainer.	. . .
INSTALLATION	a. Push terminals onto capacitor.	. . .

TERMINAL CONNECTIONS

WIRE NO.	TERMINAL
X50A16V	1
X52A16V	2

	b. Install cap.	. . .
	c. Snap capacitor into retainer.	. . .
	d. Replace top three covers.	. . .
	e. Install air conditioner.	Paragraph 3-5.

. . .

5-19. AIR FILTER

This task covers:

A. Removal
b. Cleaning
c. Inspection
d. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

SAE 30 oil
Solvent PD680
Detergent Solution
Cleaning Cloths
Container to hold solvent and air filter.

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

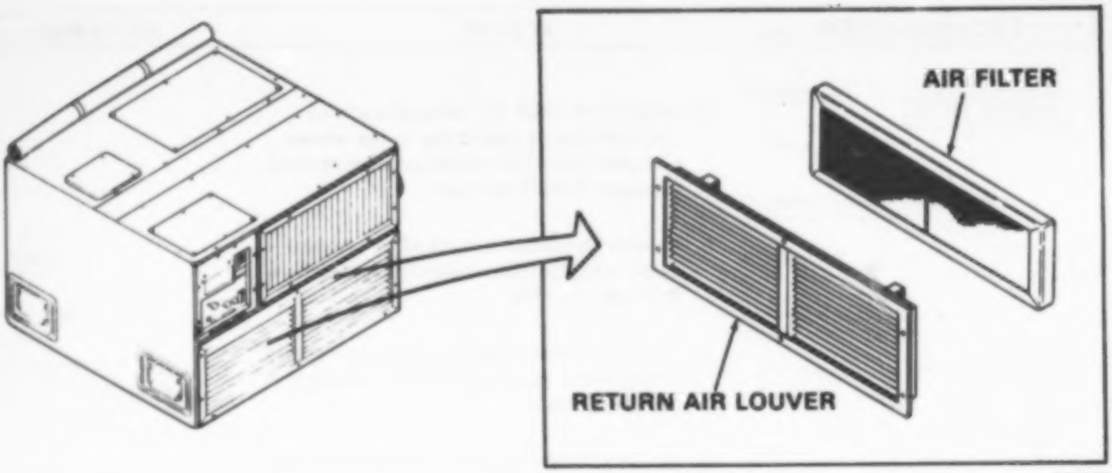
Troubleshooting References

None

Personnel Required

Organizational Maintenance

LOCATION/ITEM	ACTION	REMARKS
	NOTE The air filter consists of a shredded aluminum foil maze held between screens in an aluminum channel frame. The filter can be cleaned and re-used repeatedly. Airflow markings (arrows) printed on the frame make it easy to replace the filter in the correct position every time.	
REMOVAL	a. Remove return air louver. b. Pull filter to side, out and away from louver.	



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TM5-4120-367-14-21

Figure 5-21. Return Air Filter

LOCATION/ITEM	ACTION	REMARKS
CLEANING	**WARNING** Dry cleaning solvent (Fed. Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F to 138° F (38° C to 59° C).	
	a. Immerse the filter in detergent solution or dry cleaning solvent (Fed Spec P-D-680).	. . .
	b. Agitate until dirt is removed, using a soft brush if necessary to loosen caked-on-dirt.	. . .
	c. Rinse in clear water or clean dry cleaning solvent.	. . .
	d. Drain, then hold filter horizontal and tap each edge on bench or floor to dislodge droplets.	. . .

LOCATION/ITEM	ACTION	REMARKS
INSPECTION	a. Inspect the filter for damage such as perforations or punctures in the screen and aluminum foil maze that could permit passage of unfiltered air.	. . .
	b. Inspect for areas of packed or crushed maze material that would obstruct airflow through the filter.	. . .
	c. Check for deformation of the frame, and straighten if possible without crushing maze material.	. . .
	d. Replace filter if crushed, punctured, badly deformed, or broken.	. . .
INSTALLATION	a. Spray a very light coat of SAE oil on air intake side of air filter.	. . .
	b. Drain filter for eight hours.	. . .
	c. Wipe off excess oil.	. . .
	NOTE Airflow arrows on filter point inward toward fan intake.	
	d. Slide filter into brackets on return air louver.	. . .
	e. Install return air louver.	. . .

5-20. MIST ELIMINATOR

This task covers:

a. Removal
b. Cleaning
c. Inspection
d. Installation

INITIAL SETUP

Applicable Configurations

All

Special Environmental Conditions

None

General Safety Instructions

Test Equipment

None

Special Tools

None

Materials/Parts

Solvent PD 680
Detergent
Cleaning Cloths
Container to hold solvent
and mist eliminator

Equipment Descriptions

Power OFF
Installed in shelter

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Organizational Maintenance

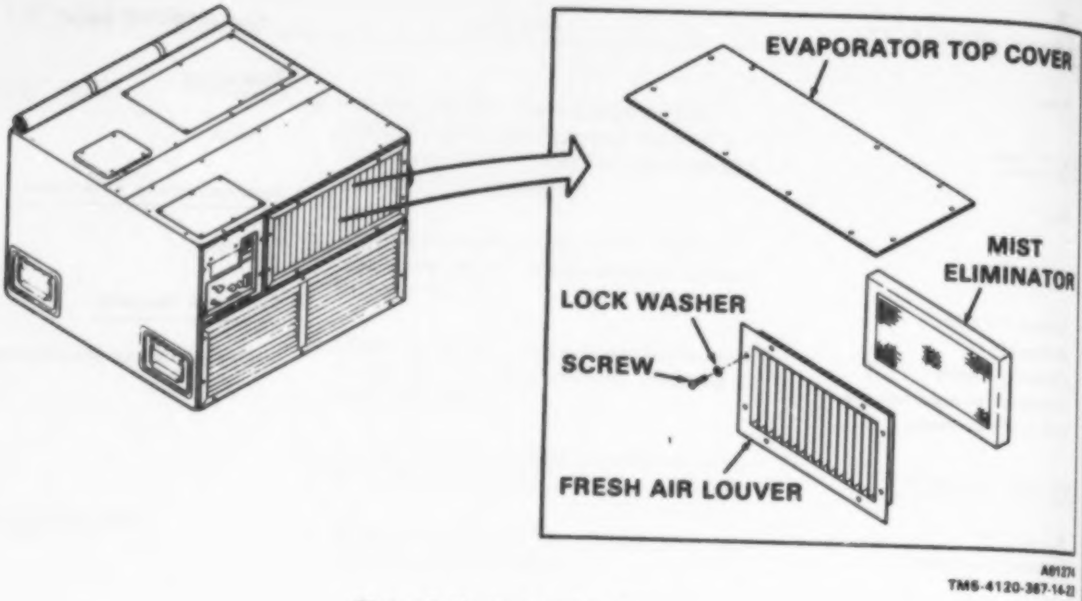
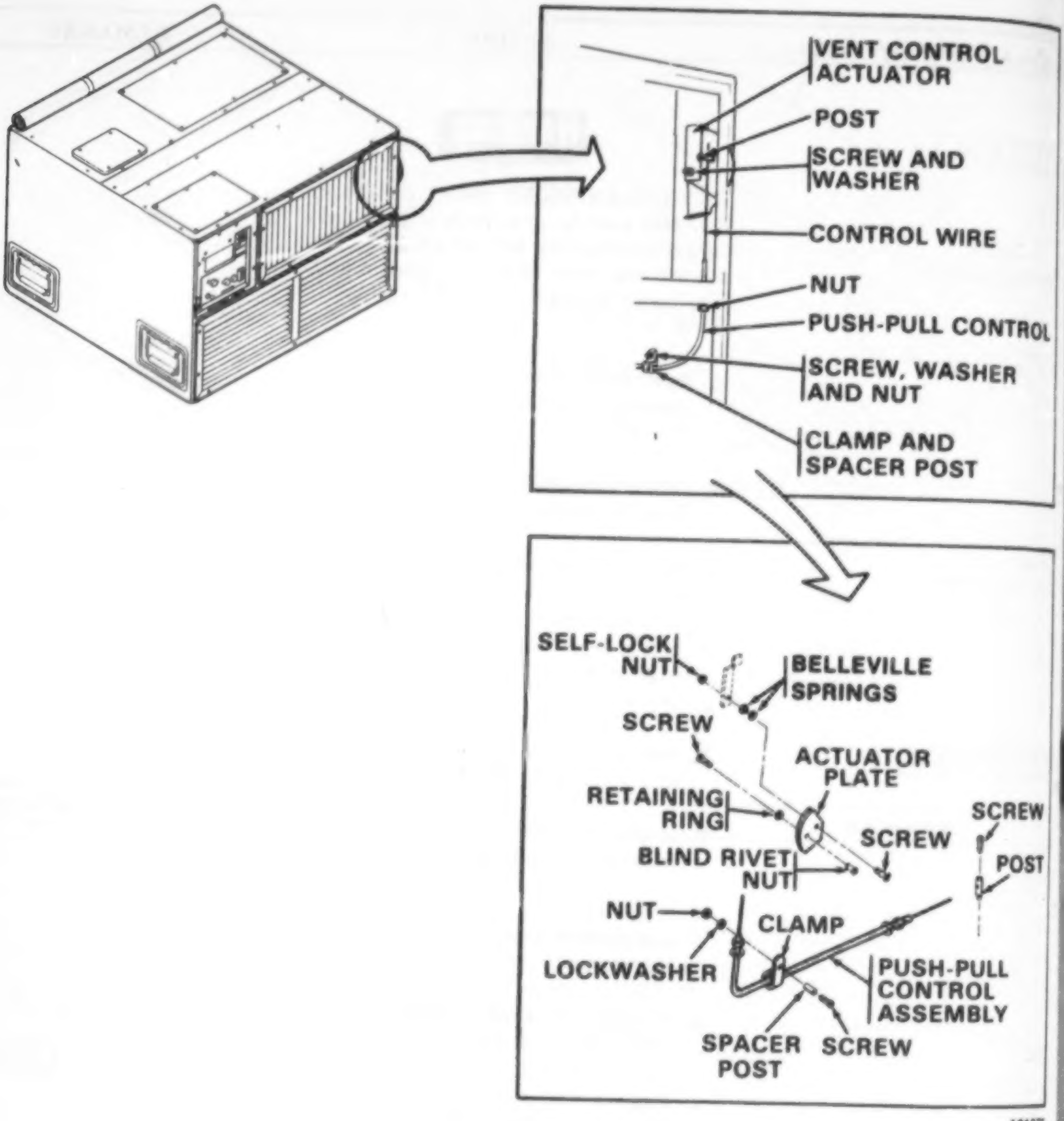

EVAPORATOR TOP COVER
MIST ELIMINATOR
LOCK WASHER
SCREW
FRESH AIR LOUVER
A01274
TM5-4120-367-14-21

Figure 5-22. Mist Eliminator

LOCATION/ITEM	ACTION	REMARKS
	NOTE The purpose of the mist eliminator is to trap droplets of condensate water formed on the evaporator coil, so that droplets will not be blown into the air conditioned space.	
REMOVAL	a. Remove evaporator top cover.	. . .
	b. Remove air outlet louver.	. . .
	c. Pry or lift mist eliminator at outer ends of bottom part of frame.	. . .

LOCATION/ITEM	ACTION	REMARKS
CLEANING	**WARNING** DRY CLEANING SOLVENT (Fed. Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).	
	a. Immerse in detergent solution or dry cleaning solvent (Fed. Spec P-D-680).	. . .
	b. Agitate until dirt is removed, using a soft brush if necessary to loosen caked-on-dirt.	. . .
	c. Rinse in clear water or clean dry cleaning solvent.	. . .
	d. Drain, then hold horizontal and tap each edge on bench or floor to dislodge droplets.	. . .
INSPECTION	a. Inspect for damage such as perforations or punctures in the screen and aluminum.	. . .
	b. Inspect for areas of packed or crushed material that would obstruct airflow.	. . .
	c. Check for deformation of the frame, and straighten if possible without crushing aluminum.	. . .
	d. Replace if crushed, punctured, badly deformed, or broken.	. . .
	e. Replace rubber insulation strip which is across top of mist eliminator, if it is torn, partly missing, missing, or damaged.	. . .
INSTALLATION	a. TOP mark must be up and airflow arrows must point outward away from coil.	. . .
	b. Slide mist eliminator downward between the side channels.	. . .
	c. Replace air outlet louver.	. . .
	d. Replace evaporator top cover.	. . .


VENT CONTROL ACTUATOR
POST
SCREW AND WASHER
CONTROL WIRE
NUT
PUSH-PULL CONTROL
SCREW, WASHER AND NUT
CLAMP AND SPACER POST
SELF-LOCK NUT
BELLEVILLE SPRINGS
SCREW
ACTUATOR PLATE
RETAINING RING
SCREW
SCREW
POST
BLIND RIVET NUT
NUT
CLAMP
LOCKWASHER
PUSH-PULL CONTROL ASSEMBLY
SPACER POST
SCREW

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TM5-4120-367-14-23

Figure 5-23. Fresh Air Damper Adjustment

5-21. FRESH AIR DAMPER

This task covers:

- a. Adjustment
- b. Removal
- c. Cleaning
- d. Inspection
- e. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Cleaning Cloths
Cable Lubricant

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

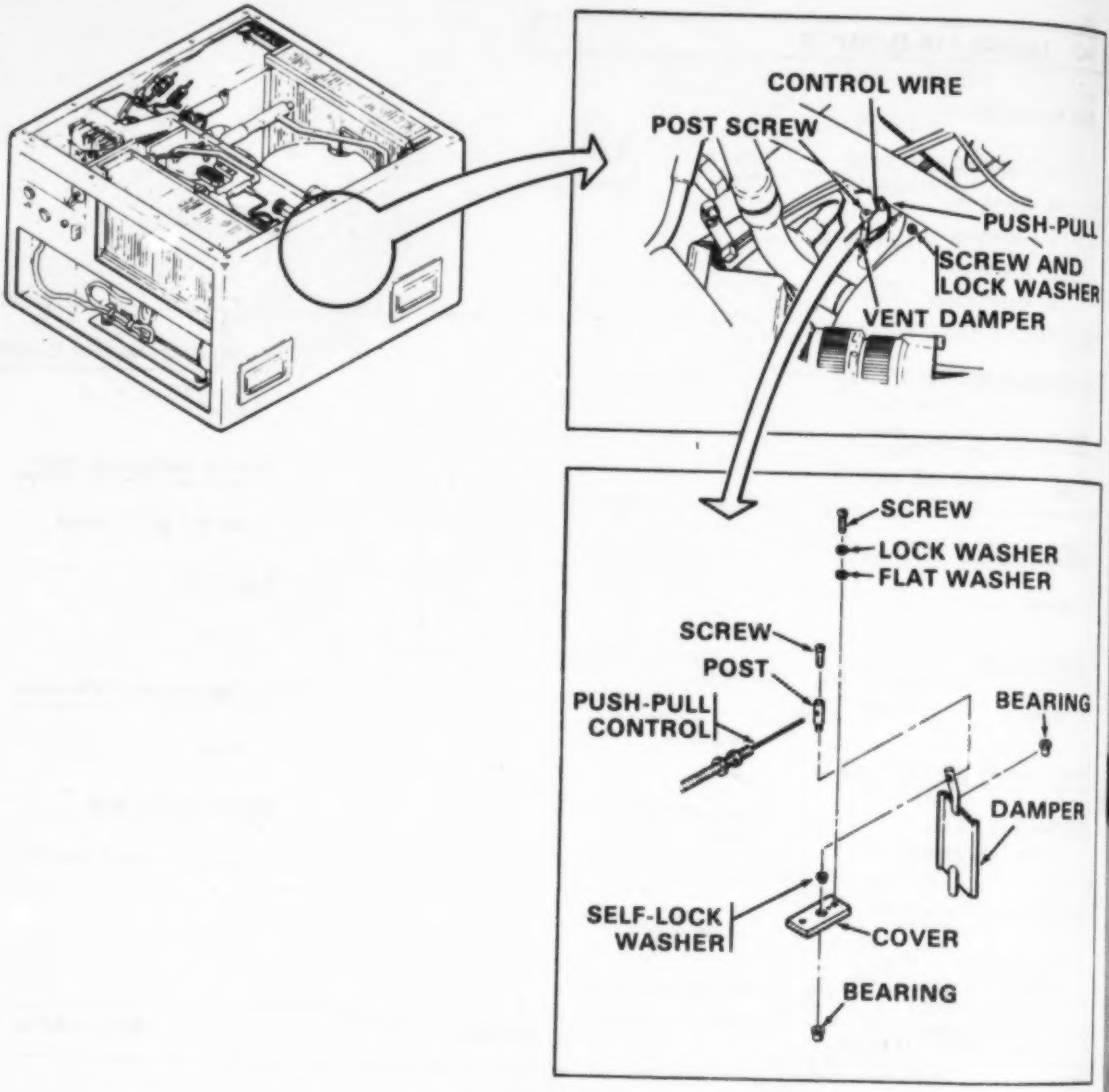
Troubleshooting References

None

Personnel Required

Organizational Maintenance

LOCATION/ITEM	ACTION	REMARKS
ADJUSTMENT	NOTE Damper opens and closes fresh air inlet passage. It is opened and closed by a push-pull type control. Unit was designed for use with CBR.	
	a. Loosen screw on mechanical post.	NOTE The wire core of a push-pull control is attached to actuator and to rod on top of damper by a mechanical post.
	b. Set actuator or damper rod and tighten screw.	. . .
	c. Control should be adjusted for center position between open and closed.	. . .


CONTROL WIRE
POST SCREW
PUSH-PULL
SCREW AND
LOCK WASHER
VENT DAMPER
SCREW
LOCK WASHER
FLAT WASHER
SCREW
POST
PUSH-PULL
CONTROL
BEARING
DAMPER
SELF-LOCK
WASHER
COVER
BEARING

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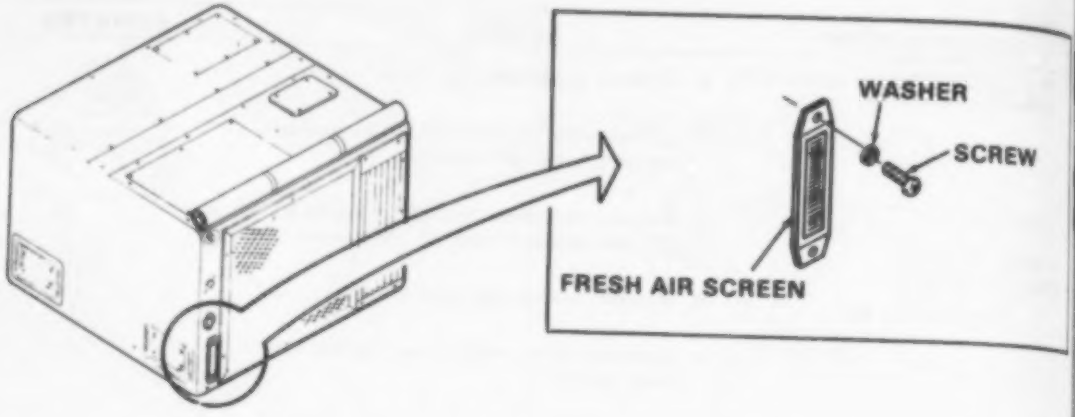
TM5-4120-367-14-24

Figure 5-24. Vent Damper

LOCATION/ITEM	ACTION	REMARKS
	d. Actuator should be in centered position and rod on top of damper should be parallel with front of housing.	. . .
	e. Check operation. The control should move smoothly between the open and closed position.	. . .

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Remove condenser top cover.	. . .
	b. Loosen screw on mechanical post and disconnect push-pull control.	. . .
	c. Remove two screws and lock washers and lift vent damper from air conditioner.	. . .
	d. Remove both evaporator louvers.	. . .
	e. Remove screw, washer, nut, spacer and loop clamp.	. . .
	f. Loosen screw and mechanical post to free end of control wire core.	. . .
	g. Remove outer nuts from both ends of control outer casing and remove push-pull control.	. . .
	h. Remove screw, nut, two spring washers and actuator.	. . .
CLEANING	a. Wipe off all loose dirt with dry cloth.	. . .
	b. Wipe off any build-up of "caked" on dirt.	. . .
INSPECTION	a. Inspect push-pull control for smooth operation of core in casing.	. . .
	b. Inspect vent damper for bent or broken condition.	. . .
	c. Inspect for loose or damaged rubber seal or damper. Cement loose rubber or replace as required.	. . .
INSTALLATION	a. Vent Control Actuator. Install actuator, screw, two spring washers and nut.	. . .
	b. Vent Damper. Install vent damper in opening in housing.	. . .
	c. Secure vent damper cover to housing with two screws and lock washers.	. . .
	d. Push-Pull Control. With one nut on each end of outer casing of push-pull control, install ends of control through opening in housing.	. . .
	e. Install outer nuts and insert ends of wire core into mechanical posts of damper and actuator.	. . .



TM5-4120-367-14&P

Figure 5-25. Fresh Air Screen

LOCATION/ITEM	ACTION	REMARKS
	f. Tighten outer nuts on casing.	. . .
	g. Install clamp, spacer, screw, nut and washer.	. . .
	h. Refer to paragraph 5-21 ADJUSTMENT to adjust the control.	. . .
	i. Install housing covers.	. . .
	j. Install evaporator inlet and outlet louvers.	. . .

5-22. FRESH AIR SCREEN

This task covers:

a. Removal
b. Cleaning
c. Inspection
d. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

Special Tools

None

Materials/Parts

Solvent PD 680
Detergent solution
Cleaning Cloths
Container to hold solvent and screen.

Equipment Descriptions

Power OFF
Installed in shelter

None

Troubleshooting Referenc

None

Personnel Required

Organizational Maintenance

LOCATION/ITEM	ACTION	REMARKS
	NOTE The fresh air screen mounted on the rear wall of the housing, covers the fresh air inlet opening to prevent air borne matter from entering the air conditioner. This unit was designed for use with CBR.	
REMOVAL	a. Remove screws, lock washers.	. . .
	b. Pull screen from unit.	. . .
CLEANING	**WARNING** Dry cleaning solvent (Fed. Spec P-D-680) used to clean parts is potentially dangerous to personnel and property.	
CLEANING	Do not use near open flame or excessive heat. Flash point of solvent is 100° F to 138° F (38° C to 59° C).	
	a. Immerse the screen in detergent solution or dry cleaning solvent (Fed Spec P-D-680).	. . .
	b. Agitate until dirt is removed, using a soft brush if necessary to loosen caked-on-dirt.	. . .
	c. Rinse in clear water or clean dry cleaning solvent.	. . .
	d. Drain, then hold horizontal and tap each edge on bench or floor to dislodge droplets.	. . .

LOCATION/ITEM	ACTION	REMARKS
INSPECTION	a. Inspect for damage such as perforations or punctures.	. . .
	b. Inspect for areas of packed or crushed material that would obstruct airflow.	. . .
	c. Check for deformation of the frame, and straighten.	. . .
	d. Replace if crushed, punctured, badly deformed, or broken.	. . .
INSTALLATION	a. Bolt screen to frame using two screws and washers.	. . .

5-23. CONDENSATE LINES

This task covers:

a. Flow test
b. Cleaning
c. Removal
d. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

One pint container
Fresh Water
Brush or soft wire

Personnel Required

Organizational Maintenance

Equipment Descriptions

Power OFF
Installed in Shelter

Special Environmental Conditions

None

General Safety Instructions

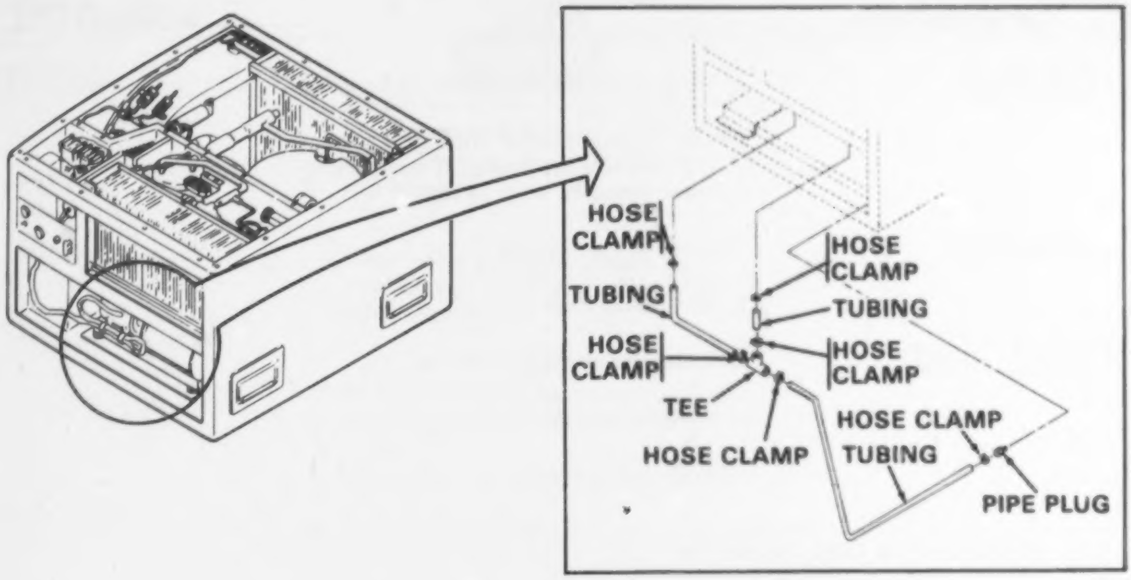
See WARNING page

References

None

Troubleshooting References

None


HOSE CLAMP
TUBING
HOSE CLAMP
TEE
HOSE CLAMP
HOSE CLAMP
TUBING
HOSE CLAMP
HOSE CLAMP
TUBING
PIPE PLUG

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TM5-4120-367-14-26

Figure 5-26. Condensate Lines

LOCATION/ITEM	ACTION	REMARKS
FLOW TEST	a. Remove mist eliminator.	Paragraph 5-20
	b. Remove air filter.	Paragraph 5-19
	c. Loosen mount bolts.	. . .
	d. Place a 3/4-inch board under one side of the air conditioner to tilt it slightly.	. . .
	e. Pour about one pint (one-half liter) of water into the lower end of the drip pan below the evaporator coil.	. . .
FLOW TEST	f. Verify that the water flows out of the drip pan through the drain tube.	. . .
	g. Tilt the air conditioner the opposite direction, and repeat the flow test on the other side.	. . .
	h. Water should drain freely through both tubes. If it does not, remove and repair or replace the drain tube.	. . .
	i. Tighten mounting bolts.	. . .
INSPECTION	a. Inspect for split or deteriorated condition.	. . .
	b. Inspect for cracks or breaks.	. . .

LOCATION/ITEM	ACTION	REMARKS
CLEANING	a. Flush out tubing using fresh clean water.	. . .
	b. Use a small diameter brush or a piece of soft wire to clean tubing. If necessary remove tubing in order to clean.	. . .
REMOVAL	a. Remove hose clamps.	. . .
	b. Pull tubing from unit.	. . .
INSTALLATION	a. Slide hose clamp onto tubing.	. . .
	b. Push tubing into place.	. . .
	c. Tighten hose clamp.	. . .

5-24. EVAPORATOR COIL CLEANING

This task covers:

a. Cleaning

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Vacuum Cleaner
Brush
Safety glasses
Compressed air and compressed air line

Personnel Required

Organizational Maintenance

Equipment Description

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

LOCATION/ITEM	ACTION	REMARKS
CLEANING	**WARNING** Do not use steam to clean the coil. Live hot steam will splash and could cause burns. The high heat could cause high system pressure. Wear safety glasses or goggles when cleaning the coil. Dirt can be blown into your eyes. **NOTE** At same time evaporator coil is cleaned the condenser coil should be cleaned.	
	a. Disconnect the power supply.	. . .
	b. Remove the top cover.	. . .
	c. Remove the mist eliminator.	Paragraph 5-20
	d. Remove the conditioned air outlet louver.	. . .
	e. Cover the evaporator blower to prevent dirt from entering the blower and motor.	. . .
	f. Clean the front and back surfaces using a soft bristle brush.	. . .
	WARNING Use compressed air at 30 psi (1.36 kg) or less. Hold compressed air nozzle at least 6 to 8 inches away from coil to keep the compressed air from damaging the coil or fins.	
	g. Use a vacuum cleaner and compressed air if necessary to clean the area between the fins.	. . .
	h. Clean the air filter.	Paragraph 5-19
	i. Clean the mist eliminator.	Paragraph 5-20
	j. Clean the condensate lines.	Paragraph 5-23
	k. Clean the evaporator blower. Use a vacuum cleaner.	. . .
	l. Replace the top cover, mist eliminator, air filter and louvers.	. . .
	m. Connect the power supply.	. . .

5-25. CONDENSER COIL CLEANING

This task covers:

a. Cleaning

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brush
Safety glasses
Compressed air and air lines
Vacuum cleaner

Personnel Required

Refrigeration specialist

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

LOCATION/ITEM	ACTION	REMARKS
CLEANING	**WARNING** Do not use steam to clean the coil. Live hot steam will splash and could cause serious burns. Also pressure could be too high and could cause coil damage. Wear safety glasses or goggles when cleaning the coil. Dirt could be blown into your eyes. **NOTE** At the same time the condenser coil is cleaned, the evaporator coil should be cleaned.	
	a. Disconnect the power supply.	. . .
	b. Remove the condenser section top cover.	. . .
	c. Cover the condenser fan and motor and compressor.	. . .
	d. Remove the condenser guard.	. . .
	e. Clean the front and back surfaces using a soft bristle brush.	. . . . . .
	WARNING Use compressed air at 30 psi (1.36 kg) or less. Hold compressed air nozzle at least 6 to 8 inches away from coil to keep the compressed air from damaging the coils or fins.	
	f. Use a vacuum cleaner and if necessary compressed air to clean the area between the fins.	. . .
	g. Use a vacuum cleaner to clean the condenser motor and fan and compressor.	. . .
	h. Replace all covers.	. . .
	i. Connect power supply.	. . .

5-26. CONDENSER FAN SWITCH S7

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Ty-rap
Hot air dryer

Personnel Required

Refrigeration specialist

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. Remove condenser section top cover.	....
	c. Cut "ty-rap" from plug P7 wires.	....
	d. Disconnect plug P7.	....
	e. Remove two screws and washers.	....
	f. Pull switch away from frame.	....
	g. Unsolder or cut wires at switch.	....
TESTING	See Table 4-3.	....

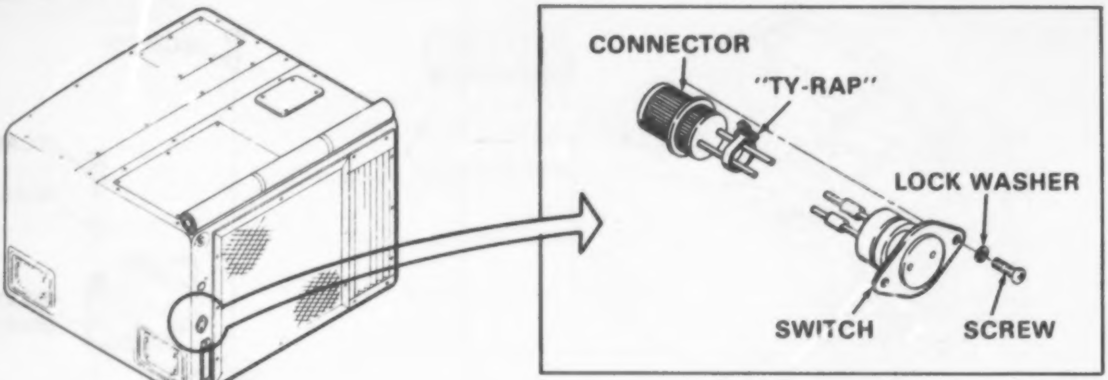

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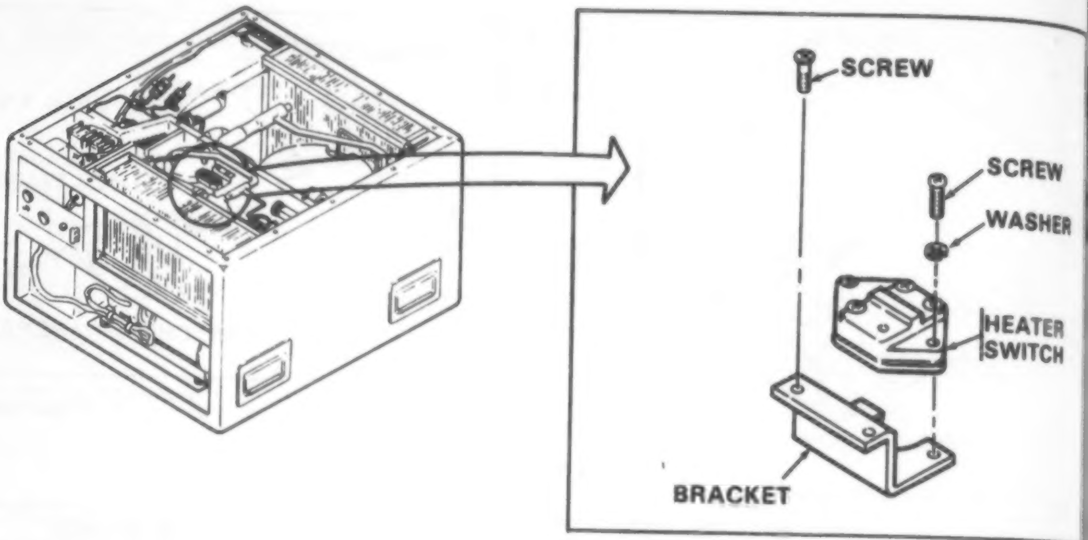
Figure 5-27. Fan Switch

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. Slip heat-shrink tubing over the two leads.	....

WIRE NO.	SWITCH TERM NO.	PLUG TERM	REMARKS
V9B20	2	A	....
V5D20	1	B	

LOCATION/ITEM	ACTION	REMARKS
	b. Pull tubing over solder joint.	....
	c. Hot air dry tubing.	....
	d. Push switch into frame.	....
	e. Secure with two screws and washers.	....
	f. Connect plug P7.	....
	i. Secure wires to cable with "ty-rap".	....
	j. Replace top cover.	....
	k. Connect power supply.	....



TM5-4120-367-14

Figure 5-28. Heater Thermostat

5-27 HEATER THERMOSTAT (OVERHEAT SAFETY)

This task covers:

a. Removal
b. Testing
c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Organizational Maintenance (2)

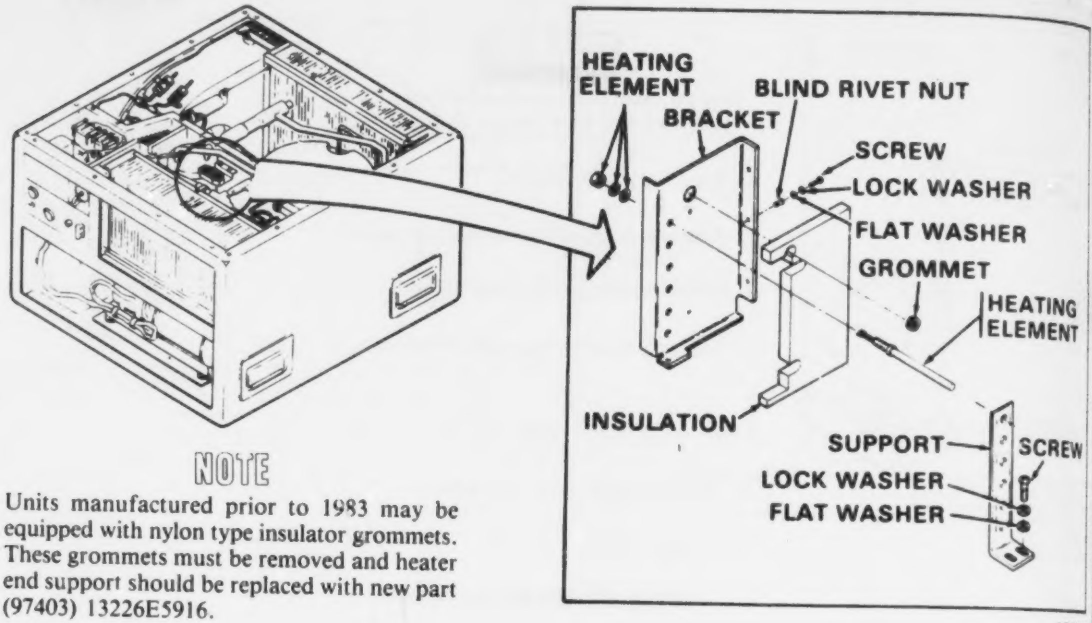
LOCATION/ITEM	ACTION	REMARKS
	WARNING Allow heaters to cool before attempting removal or test of heater thermostat.	. . . .
REMOVAL	a. Remove power supply.	. . . .
	b. Remove evaporator section top cover.	. . . .
	c. Remove thermostat from bracket.	. . . .
	d. Tag and remove wires from switch.	. . . .
TESTING	Refer to Table 4-3, step 12.	. . . .
INSTALLATION	a Attach thermostat to bracket.	. . . .
	b. Connect wires.	. . . .
	Single Phase Model F18H	. . . .

WIRE NO.	TERMINAL NO.
X46A16V	1
X44A16V, X45A16V	2
X31B16V	3
X44A16V	4

LOCATION/ITEM	ACTION	REMARKS
	3 Phase Model F18H-3 & F18H-4	. . .

WIRE NO.	TERMINAL NO.
X49A16B	1
X50A16C, X47A16A	2
X48A16A	3
X47A16A	4

LOCATION/ITEM	ACTION	REMARKS
	c. If thermostat bracket was loosened or removed, reattach to center cover.	. . .
	d. Install cover.	. . .
	e. Install air conditioner.	Paragraph 3-5.


HEATING ELEMENT
BLIND RIVET NUT
BRACKET
SCREW
LOCK WASHER
FLAT WASHER
GROMMET
HEATING ELEMENT
INSULATION
SUPPORT
SCREW
LOCK WASHER
FLAT WASHER

NOTE

Units manufactured prior to 1983 may be equipped with nylon type insulator grommets. These grommets must be removed and heater end support should be replaced with new part (97403) 13226E5916.

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TM5-4120-367-14-31

Figure 5-29. Heater

5-28. HEATER

This task covers

a. Removal
b. Cleaning
c. Testing
d. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

Cleaning Cloths

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Organizational Maintenance (2)

LOCATION/ITEM	ACTION	REMARKS
	WARNING High voltage can kill.	
	WARNING Allow heater to cool before handling, severe burns can result from touching hot heater.	**NOTE** Model F18H has six 230 volt heaters; Models F18H-3 and F18H-4 have six 120 volt heaters.
REMOVAL	a. Remove power supply.	. . .
	b. Remove air conditioner from shelter.	Paragraph 3-5.
	c. Remove all three top covers.	. . .
	d. Remove heater thermostat from middle cover.	Do not remove leads.
	e. Remove heater support.	. . .
	f. Remove four screws.	. . .
	g. Remove nut from top heater. Allow it to slide onto heater terminal.	. . .
REMOVAL	h. Pull top heater from heater bracket.	Heater lead will only allow slight movement of heater.
	i. Pull heater bracket up and out of air conditioner until top heater lead can be tagged. Remove lead from terminal board.	Use caution, 2nd heater from top will prevent movement of bracket when heater touches refrigerant piping.
	j. Remove each of remaining five heaters in same manner as first was removed.	. . .
CLEANING	**WARNING** Allow heaters to cool before handling. **CAUTION** Do not use solvent or detergent to clean heater. Either one could damage heater.	
	a. Use clean dry cloth to wipe dust or dirt off heater.	**NOTE** It is not necessary to remove heaters for cleaning.

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LOCATION/ITEM	ACTION	REMARKS
TESTING	Refer to Table 3-7, step 14.	. . .
INSTALLATION	a. Position heater bracket into frame so that heaters can be installed one at a time.	. . .

Single Phase Model F18H

WIRE NO.	HEATER	TB2
X46D16V	HR1-1	5
X18C16V	HR1-2	1
X46E16V	HR3-1	5
X18F16V	HR3-2	2
X46B16V	HR5-1	7
X18E16V	HR5-2	2
X45D16V	HR2-1	6
X32D16V	HR2-2	3
X45E16V	HR4-1	6
X32E16V	HR4-2	3
X46B16V	HR6-1	8
X32B16V	HR6-2	4

3 Phase Models F18H-3 & F18H-4

WIRE NO.	HEATER	TB2
X52A16C	HR1-1	7
X19C16C	HR1-2	1
X54A16B	HR3-1	8
X18C16B	HR3-2	2
X56A16A	HR5-1	9
X17C16A	HR5-2	3
X55A16C	HR2-1	7
X59B16C	HR2-2	4
X53A16B	HR4-1	8
X60B16B	HR4-2	5
X51A16A	HR6-1	9
X39B16A	HR6-2	6

	b. Install one heater at a time and slide bracket down after each heater is installed.	. . .
	c. Slip nut, lockwasher, and insulating washer over heater leads before leads are connected to terminal board TB2.	. . .
	d. Insert heaters in bracket and support.	. . .
	e. Install and tighten bracket.	. . .
	f. Replace heater thermostat.	Paragraph 3-45.
	g. Replace top covers.	. . .
	h. Install air conditioner.	. . .

CHAPTER 6

DIRECT AND GENERAL SUPPORT MAINTENANCE

6-1. PRESSURE TEST

This task covers:

a. Pressure test refrigerant system.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

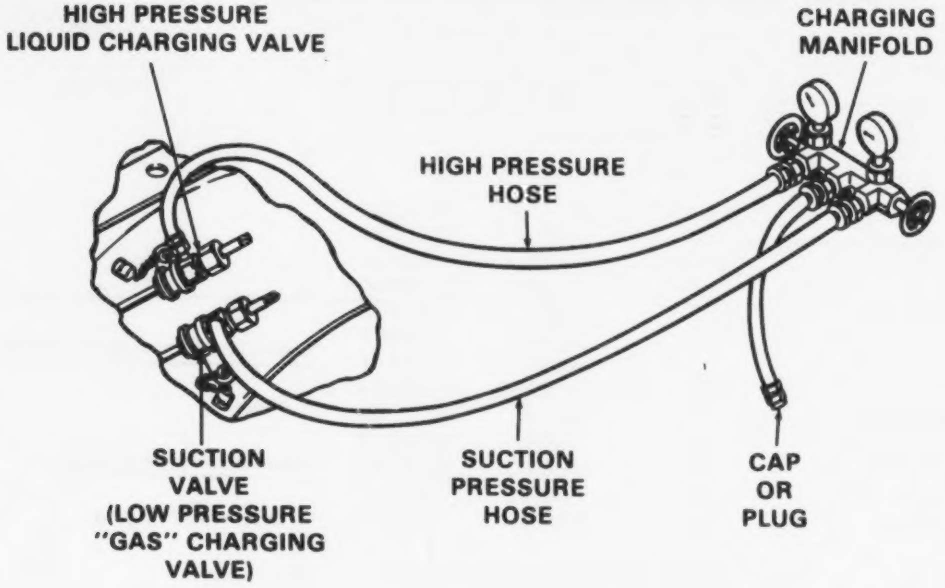
Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
CONDENSER SECTION CHARGING VALVES. SET-UP	a. Remove charging valve access panel.	. . .
	b. Connect charging manifold to suction and high (head) pressure gauges.	. . .
	c. Make sure middle hose is capped or plugged.	. . .


HIGH PRESSURE
LIQUID CHARGING VALVE
CHARGING
MANIFOLD
HIGH PRESSURE
HOSE
SUCTION
VALVE
(LOW PRESSURE
"GAS" CHARGING
VALVE)
SUCTION
PRESSURE
HOSE
CAP
OR
PLUG

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TM5-4120-367-14-33

Figure 6-1. Pressure Test

LOCATION/ITEM	ACTION	REMARKS
SET UP	d. Make sure that the fresh air damper is completely closed, and that the evaporator air intake and discharge grilles are fully open.	. . .
	e. Hang an accurate thermometer directly in front of the evaporator air intake grille to register "dry bulb return air to unit" temperature.	. . .
	f. Hang an accurate thermometer directly in front of the condenser coil guard, making sure that the thermometer is shaded from direct sunlight, to record "outdoor ambient temperature."	. . .
	g. If indoor ambient temperature is too low, provide a space heater to raise the "dry bulb return air to unit" temperature to 80° F (27° C)	. . .

LOCATION/ITEM	ACTION	REMARKS
PROCEDURE	a. Turn the MODE switch to COOL, and the temperature SELECTOR switch to maximum COOLER.	. . .
	b. Slowly open the charging valves to which pressure gauges have been connected.	. . .
	c. Let the air conditioner operate for at least 15 minutes in the cooling mode, so that all parts of the system are stabilized.	. . .
	d. Record the temperatures indicated by both thermometers and the pressure indicated by both pressure gauges.	. . .
	e. Compare the readings obtained from pressure testing with the normal ranges shown in Table 6 -1.	. . .
ANALYSIS OF DISCREPANCIES	a. If actual pressure-temperature relationships differ from those shown in Table 6-1, take appropriate action.	. . .
	(1) If pressures are too low: See Table 6-3 and 6-4.	. . .
	(2) If pressures are too high: See Table 6-3.	. . .
	(3) If discharge pressure is extremely high and suction pressure is extremely low, blockage may exist in the refrigeration system. Troubleshoot, correct the trouble, recharge if necessary, and repeat the pressure test.	. . .
COMPLETION	a. After pressure testing has been successfully completed, close the suction and discharge service valves.	. . .
	b. Drain the pressure from the charging manifold and hose very slowly by cracking the hose on the suction and discharge service valves.	. . .
	c. Remove thermometers and charging manifold from the unit.	. . .

Table 6-1 NORMAL TEMPERATURE - PRESSURE RELATIONSHIPS

95° F (35° C) dry bulb return air to unit

Outdoor ambient temperature	50° F 10°C	75° F 24°C	100° F 38° C	110° F 43.5° C	125°F 52°C
Gauge Pressures					
Suction (psig)	56-60	56-65	65-75	70-80	75-90
(Kg/Cm²)	3.93-4.22	3.93-4.57	4.57-5.27	4.92-5.62	5.27-6.33
Discharge (psig)	135-155	185-205	275-295	375-380	400-420
(Kg/Cm²)	9.50-10.90	13.00-14.41	19.33-20.74	26.36-26.72	28.12-29.53

80° F (27° C) dry bulb return air to unit

Outdoor ambient temperature	50° F 10°C	75° F 24°C	100° F 38°C	125°F 52°C
Gauge Pressures				
Suction (psig)	56 min.	56 min.	56-65	65-75
(Kg/Cm²)	3.93 min.	3.93 min.	3.93-4.57	4.57-5.27
Discharge (psig)	130-150	180-200	270-290	290-410
(Kg/Cm²)	9.14-10.55	12.65-14.06	18.98-20.39	20.39-28.82

NOTE: Dry bulb temperatures are measured with an ordinary thermometer

Table 6-2 EXCESSIVE HEAD AND SUCTION PRESSURE

POSSIBLE CAUSE	REMEDY
1. Unit overcharged	1. Purge excess refrigerant.
2. Restricted condenser air.	2. Check for free air flow. a. Check condenser louver adjustment. b. Check for any restrictions to air flow. c. Check operation actuating cylinder. d. Condenser fan or motor needs repair or replacement.
3. Air in system NOTE It may be necessary to release entire charge and then recharge system.	3. Check for leaks on suction side; release refrigerant, check operation.

Table 6-3 LOW HEAD PRESSURE

POSSIBLE CAUSE	REMEDY
1. Low refrigerant charge	1. Completely charge then leak test, repair, and recharge to 5.5 lbs. (2.5 kg)
2. Restriction in liquid line.	2. Locate and repair.
3. Charging valve leaking.	3. Replace.
4. Fan thermostat defective	4. Replace.
5. Actuating cylinder defective	5. Replace.

Table 6-4 LOW SUCTION PRESSURE

POSSIBLE CAUSE	REMEDY
1. Low refrigerant charge.	1. Completely charge then leak test, repair and recharge to 5.5 lbs. (2.5 kg).
2. Restriction in expansion valve.	2. Repair or replace.
3. Low evaporator air flow	3. Restriction, dirty filter, dirty mist eliminator, motor or blower.
4. Outdoor ambient at or near 0° (-18°C)	4. It will be necessary to jumper LPCO to operate at this outdoor temperature.

6-2. LEAK TEST

This task covers:

a. Leak test of refrigerant system.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Electronic Leak Detector

Special Tools

None

Materials/Parts

Safety glasses
Detergent Solution
Cleaning cloths
Tools (Paragraph 3-1)
Thermal gloves.
Charging manifold
Nitrogen cylinder

Equipment Descriptions

Power ON
Installed in or removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

Operating Instructions for Leak Detector

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
TUBING, JOINTS, COMPONENTS SOAP SOLUTION	**NOTE** Requires system to be pressurized with nitrogen or proper charge of R-22. a. Remove condenser and evaporator top covers. **WARNING** Disconnect power.	

LOCATION/ITEM	ACTION	REMARKS
SOAP SOLUTION	b. Using extreme care to avoid touching fan, blower or electrical components brush soap or detergent solution on all possible points of leakage.	. . .
	c. Follow definite sequence to avoid missing any points that should be tested.	. . .
	d. Watch for bubbles.	. . .
	e. Mark point at which leak is found.	. . .
	f. Wipe solution from all joints.	. . .
LEAK TESTER	**WARNING** Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation where skin-or-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot metal surfaces. Heat causes the refrigerant to break down and form carbonly chloride (phosgene), a highly toxic and corrosive gas.	
	WARNING Disconnect power.	
	CAUTION The electronic leak detector is sensitive to the presence of refrigerant gas in the atmosphere. When refrigerant gas is present in the atmosphere of the work area, false indications can result. Use in a well ventilated but draft-free area.	
	a. Position refrigerant drum so that only refrigerant gas will be used and connect to center hose of charging manifold.	. . .
	b. Remove caps from both charging valves and loosely connect hose from charging manifold to valves. Purge air from lines and tighten hoses on valves.	. . .
	c. Open both charging valves and allow refrigerant to flow into system until gauges indicate 50 PSIG (3.5 Kg/CM2).	. . .

LOCATION/ITEM	ACTION	REMARKS
	d. Close both charging valves, charging manifold valves and refrigerant drum valve.	. . .
	e. Disconnect refrigerant cylinder.	. . .
	f. Connect nitrogen regulator (para 3-1) to nitrogen cylinder.	. . .
	g. Connect nitrogen regulator to center connection on charging manifold.	. . .
	h. Open nitrogen regulator valve slowly.	. . .
	i. Open discharge service valve and suction service valve. *Do not turn on air conditioner.*	
	j. Slowly open both valves on charging manifold & charge system to 350 PSIG ($22 Kg/Cm^2$).	. . .
	k. Close *all* valves.	. . .

NOTE

Tester must be calibrated for a pure refrigerant leak rate of 0.1 ounce (2.84 g) per year.

LOCATION/ITEM	ACTION	REMARKS
	l. Turn on electronic leak detector & slowly pass probe around all points in the system where a leak could exist.	. . .
	m. Depending upon the type of detector used, a leak will be indicated by an audible signal, a light, or by meter deflections.	. . .
	n. When leak is found, mark leak point.	. . .
	o. Disconnect hose between charging manifold and nitrogen regulator.	. . .
	p. Open manifold valves.	. . .

WARNING

Discharge refrigerant in an open area and *not* around an open flame.

LOCATION/ITEM	ACTION	REMARKS
	CAUTION Discharge the system *slowly* to reduce oil loss from compressor.	
	q. Using refrigeration wrench, *slowly* open *LOW SIDE* valve to allow refrigerant gas to flow slowly out of hose.	. . .
	r. Using refrigeration wrench, *slowly* open *HIGH SIDE* valve to allow refrigerant gas to flow slowly out of hose.	. . .
	s. Close both service valves when gas stops flowly out of hose.	. . .

6-3. REPAIR

This task covers general information needed by a technician to repair this unit.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

- Brazing Flux
- Brazing Alloy
- Charging Manifold
- Safety glasses
- Brazing and Soldering Set
- Solvent PD680
- Detergent Solution
- Cleaning cloths
- Refrigerant R22
- Nitrogen (cylinder)
- Tools (Paragraph 3-1)
- Abrasive cloth
- Scale
- Thermal gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
	NOTE The following instructions are provided for use by refrigeration shops furnished with only the most basic equipment. If more sophisticated equipment, such as two-valve or four-valve service manifolds are available, they should be used by making appropriate modifications to these instructions.	
OPENING SYSTEM	a. When the refrigeration system must undergo maintenance that requires the system to be opened for removal of parts, the system must first be discharged and purged.	Paragraphs 6-4 and 6-5.
	b. After the repair has been made and all soldering completed, the system must be charged and tested for leaks.	Paragraph 6-7 or 6-8 and 6-2
REMOVAL OF PARTS	a. It may be necessary to remove some tubing and fittings with a part that is to be replaced.	. . .
	b. The tubing and fittings can then be removed from the defective part and installed in the new part.	. . .
	c. Care should be exercised in opening joints or resoldering to prevent damage to other parts of the air conditioner.	. . .
	NOTE If soldering is necessary on any part of the system, a constant purge of dry nitrogen must be fed through the system being soldered to prevent scale formation within the system.	
BRAZING	a. Braze copper to copper joints with silver solder Grade III, IV or VI specifications QQ-B-654 and copper to brass or copper to steel with Grade IV, or VI specifications QQ-B-654 per MIL-B-7883.	. . .
	b. Solder melting point is 1160° F. (626° C).	. . .
	c. All brazed or solder joints shall be made with an atmosphere of nitrogen to prevent internal oxidation.	. . .

LOCATION/ITEM	ACTION	REMARKS
INSULATION AND GASKETS	a. Replace damaged insulation and gaskets.	. . .
	b. Cement loose insulation.	. . .
HARDWARE	a. Replace any damaged screws, washers, lock washers or nuts.	. . .
	b. Use screws of correct length to hold parts securely.	. . .
	c. In some applications screws that are too long may bottom before the head is tight against part it is to hold or may cause damage to the threads or other parts.	. . .
DEBRAZING	a. With dry nitrogen flowing through the system, debraze tubing connections at any fitting near the compressor that will permit convenient removal.	. . .
	b. Tubing and fittings attached to the compressor after its removal can be transferred to the replacement compressor before installation in the air conditioner.	. . .
SHIMS	a. Be sure to remove all shims where used.	. . .
	b. Keep shims together and identify them as to location.	. . .
REPAIRING DAMAGED THREADS	a. Damaged threads should be repaired by use of a thread restorer or by chasing in a lathe.	. . .
	b. Internal threads should be repaired with a tap of the correct size.	. . .
	c. If threads cannot be satisfactorily repaired, replace the part.	. . .
REPAIR OF DAMAGED MACHINED AND POLISHED SURFACES	a. Smooth rough spots, scores, burrs, galling, and gouges from damaged machined and polished surfaces so the part will efficiently perform its normal function.	. . .
	b. The finish of the repaired part is to approximate that of the original finish.	. . .
	c. In performing any of these operations, critical dimensions must not be altered.	. . .

LOCATION/ITEM	ACTION	REMARKS
REMOVAL OF RUST OR CORROSION	a. Remove corrosion from all parts of material.	. . .
	b. To remove rust or corrosion, use wire brush, abrasive cloth, sand blast, vapor blast equipment, or rust remover except highly polished surfaces.	. . .
	c. On these surfaces, buffing or the use of crocus cloth is recommended.	. . .
TUBES AND FITTINGS	a. Check tubes and fittings for cracked or split condition.	. . .
	b. Check tubing for kinks.	. . .
	c. Replace defective fittings.	. . .
	d. Replace damaged tubing with tubing of same size.	. . .
	e. Take care in making bends in tubing to prevent kinking of tubing.	. . .
	f. All tubing and fittings must be completely clean on inside prior to installation.	. . .

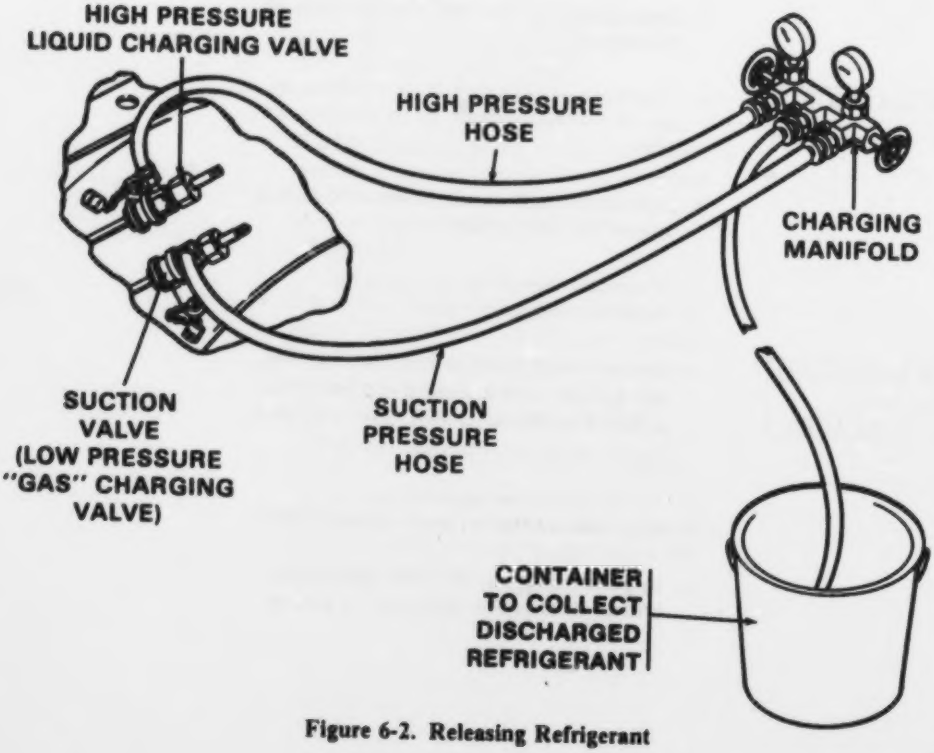

HIGH PRESSURE LIQUID CHARGING VALVE
HIGH PRESSURE HOSE
CHARGING MANIFOLD
SUCTION VALVE (LOW PRESSURE "GAS" CHARGING VALVE)
SUCTION PRESSURE HOSE
CONTAINER TO COLLECT DISCHARGED REFRIGERANT
A0128
TM5-4120-367-14-34

Figure 6-2. Releasing Refrigerant

6-4. RELEASING REFRIGERANT

This task covers the procedure for releasing refrigerant.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

- Charging Manifold
- Safety glasses
- Cleaning cloths
- Tools (Paragraph 3-1)
- Thermal gloves
- Container

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
DISCHARGE	**WARNING** Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation where skin - or eye contact is possible. Prevent contact of refrigerant gas with flame or hot metal surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.	

LOCATION/ITEM	ACTION	REMARKS
	WARNING Avoid contact with refrigerant being discharged from compressor burnout. Acid in refrigerant can cause burns.	
	CAUTION To prevent excessive loss of compressor oil, release system, slowly over a period of two hours.	
DISCHARGE	a. Remove caps from charging valves.	. . .
	b. Connect charging manifold to charging valves.	. . .
	c. Attach hose assembly end to manifold center connection and place other end in a container.	. . .
	d. Open manifold valves.	. . .
	WARNING Discharge refrigerant in an open area and *not* around an open flame.	
	CAUTION Discharge the system *slowly* to reduce oil loss from compressor.	
	e. Using refrigeration wrench, *slowly* open *LOW SIDE* valve to allow refrigerant gas to flow slowly out of hose.	. . .
	f. Using refrigeration wrench, *slowly* open *HIGH SIDE* valve to allow refrigerant gas to flow slowly out of hose.	. . .
	g. Close both service valves when gas stops flowing out of hose.	. . .

6-5. NITROGEN PURGE

This task covers the nitrogen purge procedure.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Thermal gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
PURGE	a. Release refrigerant charge. **CAUTION** Nitrogen pressure in the system should not exceed 10 pounds.	Paragraph 6-4
	b. Attach middle hose from charging manifold to dry nitrogen cylinder valve.	. . .
	c. Connect hose from charging manifold low side to suction charging valve.	. . .
	d. Open both charging valves.	. . .
	e. Open cylinder valve and allow dry nitrogen to flow through system until all moisture is forced out. (Not less than 5 minutes).	. . .
	f. Close cylinder valve.	. . .
	g. Close both charging valves.	. . .
	h. Disconnect all hoses.	. . .

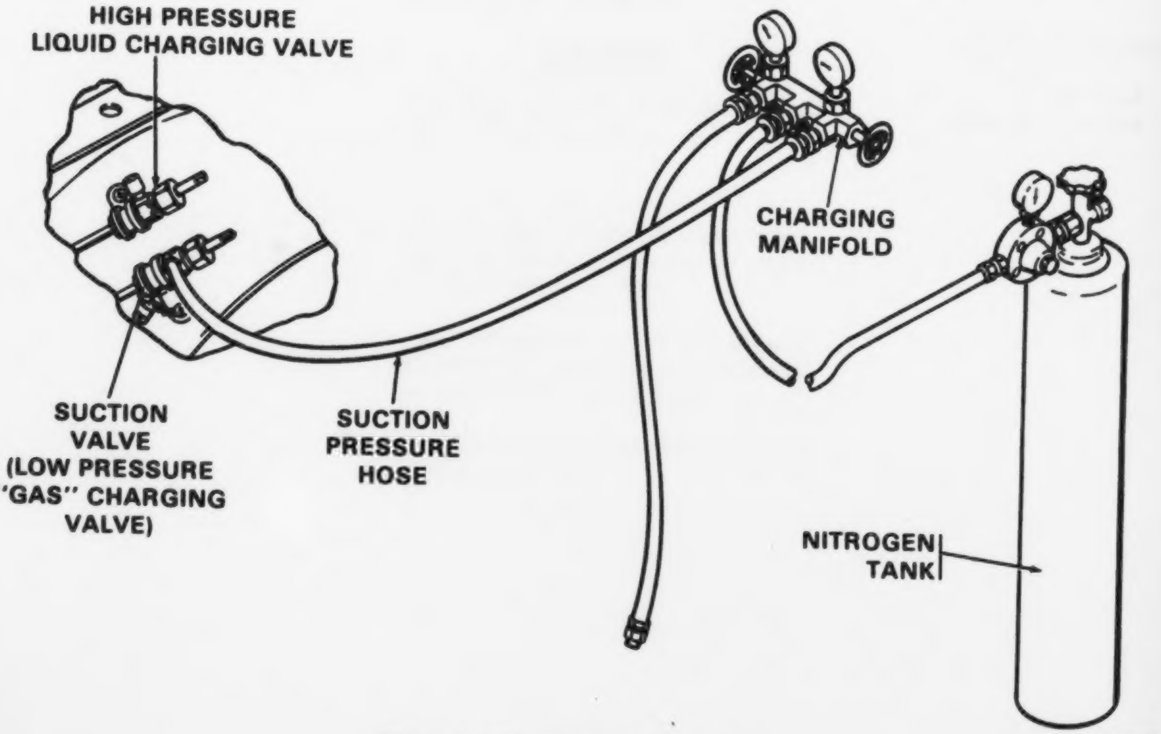

HIGH PRESSURE LIQUID CHARGING VALVE
CHARGING MANIFOLD
SUCTION VALVE (LOW PRESSURE "GAS" CHARGING VALVE)
SUCTION PRESSURE HOSE
NITROGEN TANK

Figure 6-3. Nitrogen Tank Connection

A01287
TM5-4120-367-14-35

6-6. EVACUATION

This task covers connecting a vacuum pump to remove all contamination from the refrigerant piping.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Tools (Paragraph 3-1)
Vacuum pump

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
VACUUM PUMP	a. Leak test system.	Paragraph 6-1.
	b. Install new filter/dryer.	Paragraph 6-15
	c. Close charging manifold valves.	. . .
	d. Remove caps from charging valves.	. . .
	e. Attach manifold hoses to the charging valves.	. . .
	f. Attach middle hose to a vacuum pump.	. . .
	g. Start vacuum pump.	. . .
	h. Open manifold valves.	. . .

LOCATION/ITEM	ACTION	REMARKS
VACUUM PUMP	i. Open both charging valves.	. . .
	j. Run the vacuum pump until at least 29 inches of mercury, measured on the vacuum pump gauge is reached.	. . .
	NOTE Inability to reach 29 inches of mercury may indicate a leak *or* problem with pump.	
	k. Continue running the pump for 1 more hour, observing the vacuum pump gauge. If the gauge needle moves back and forth, there is a refrigerant leak which must be located and corrected.	. . .
	l. Close manifold valves.	. . .
	m. Close both charging valves.	. . .
	n. Stop vacuum pump.	. . .

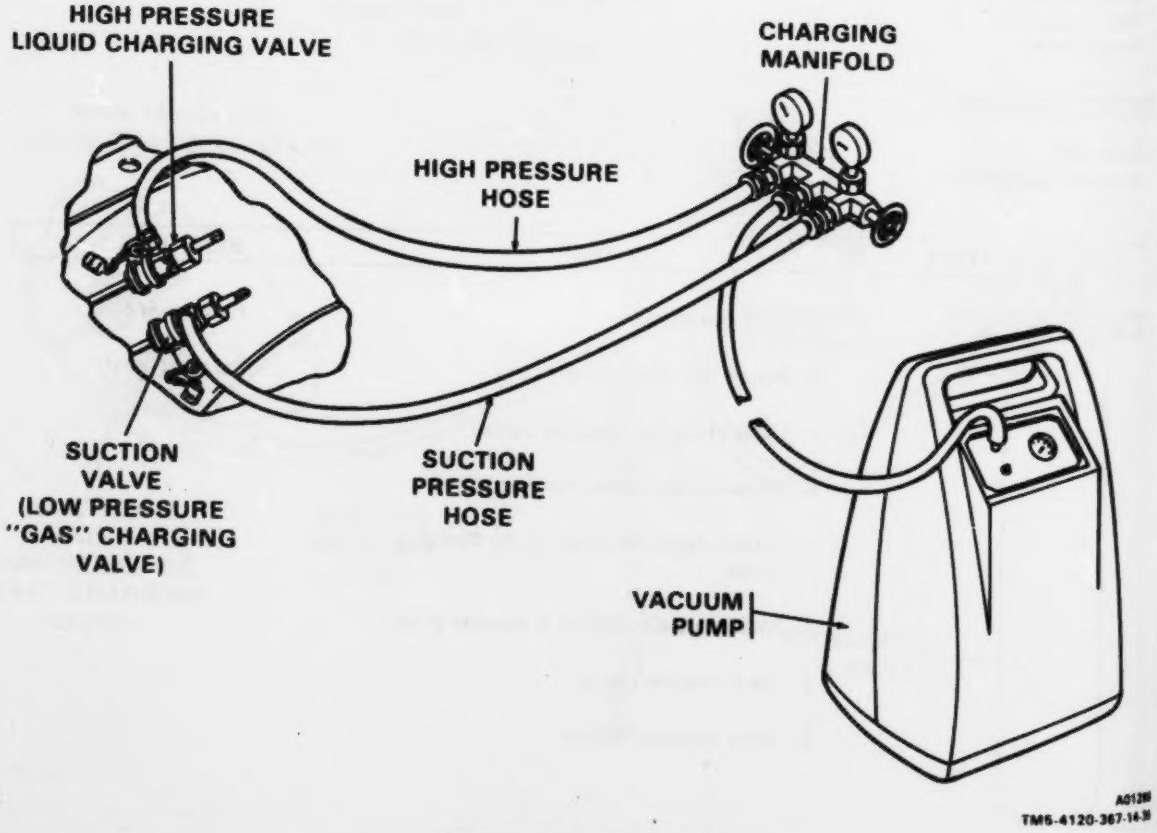

HIGH PRESSURE LIQUID CHARGING VALVE
CHARGING MANIFOLD
HIGH PRESSURE HOSE
SUCTION VALVE (LOW PRESSURE "GAS" CHARGING VALVE)
SUCTION PRESSURE HOSE
VACUUM PUMP
A012
TM5-4120-367-14-3

Figure 6-4. Evacuating System

6-7. REFRIGERANT CHARGING WITH GAS

This task covers procedures to add refrigerant gas to a system which is low on refrigerant.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Cleaning cloths
Refrigerant R22
Tools (Paragraph 3-1)
Thermal gloves

Equipment Descriptions

Power OFF
Installed or removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

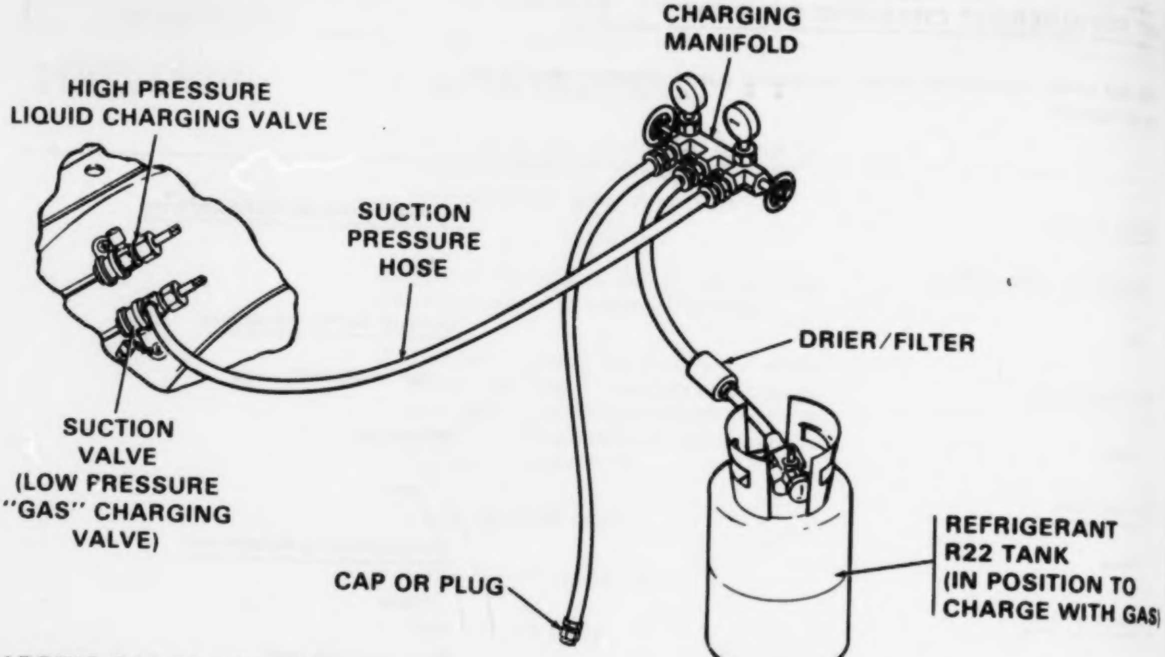
Troubleshooting References

None

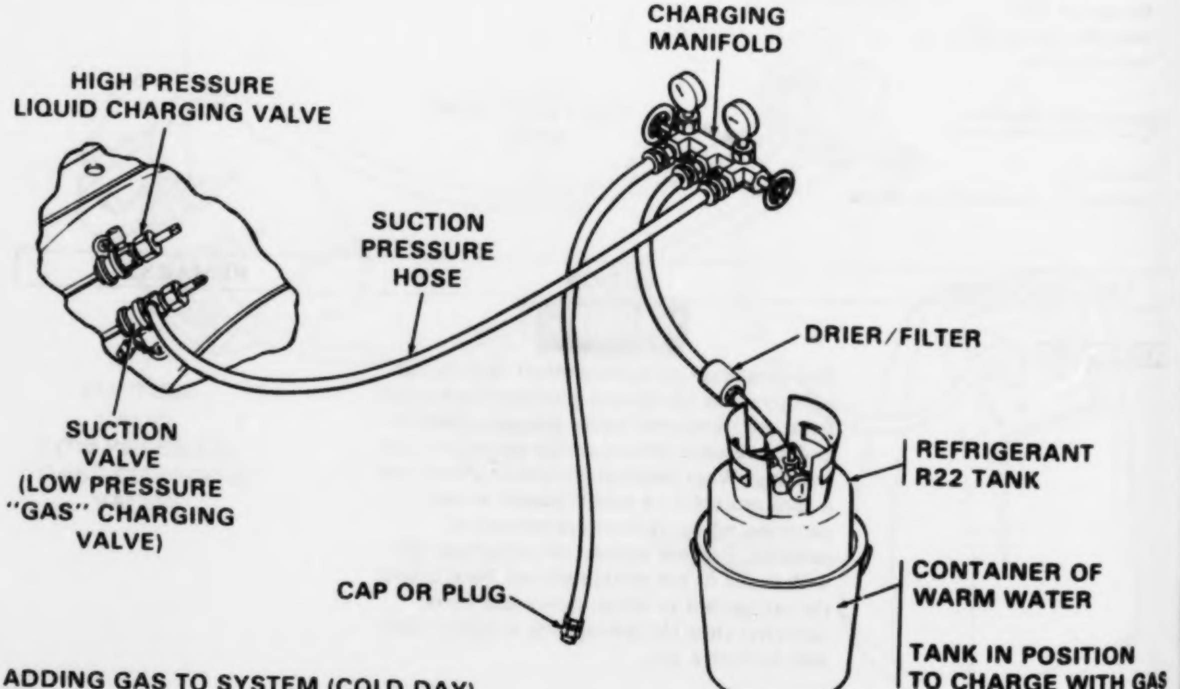
Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
CHARGING	**WARNING** Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation where skin-or-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot metal surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.	


CHARGING MANIFOLD
HIGH PRESSURE LIQUID CHARGING VALVE
SUCTION PRESSURE HOSE
DRIER/FILTER
SUCTION VALVE (LOW PRESSURE "GAS" CHARGING VALVE)
REFRIGERANT R22 TANK (IN POSITION TO CHARGE WITH GAS)
CAP OR PLUG

ADDING GAS TO SYSTEM


CHARGING MANIFOLD
HIGH PRESSURE LIQUID CHARGING VALVE
SUCTION PRESSURE HOSE
DRIER/FILTER
SUCTION VALVE (LOW PRESSURE "GAS" CHARGING VALVE)
REFRIGERANT R22 TANK
CONTAINER OF WARM WATER
TANK IN POSITION TO CHARGE WITH GAS
CAP OR PLUG

ADDING GAS TO SYSTEM (COLD DAY)

A01280
TM8-4120-387-14-37

Figure 6-5. Refrigerant Charging, Gas

LOCATION/ITEM	ACTION	REMARKS
CHARGING	**CAUTION** Do not attempt to charge liquid refrigerant into the suction line. The compressor would be damaged. **CAUTION** If compressor knocking or pounding is heard when charging with gas, shut down at once and release some refrigerant. **NOTE** Two kinds of refrigerant drums are in general use. One is equipped with a single shutoff valve, and must be inverted when charging liquid refrigerant. The other is equipped with a vapor valve and a liquid valve, which makes it possible to charge either liquid or vapor when the drum is upright.	
	a. Place refrigerant drum in upright position.	. . .
	CAUTION When adding refrigerant, use extreme care to avoid adding refrigerant to the system too fast which would cause slugging at the compressor.	
	b. Remove cap from low pressure (suction side) charging valve and loosely connect charging line to valve. Purge air from line.	. . .
	c. Open refrigerant drum valve slightly to purge air from charging line . Tighten connection at charging valve. Close refrigerant drum valve.	. . .
	d. With the air conditioner operating slowly admit gas to system.	. . .
	e. Close valves and carefully loosen the charging line to release trapped pressure. Disconnect charging line and install charging valve cap. Operate air conditioner in cooling mode for 15 minutes.	. . .
	f. Check liquid sight indicator. If indicator regularly shows bubbles, repeat steps b through e adding refrigerant until indicator is clear.	. . .
	NOTE On cold days it may be necessary to place refrigerant drum in container of warm water not over 120°F (48.9°C).	

6-8. REFRIGERANT CHARGING WITH LIQUID

This task covers procedures to add liquid refrigerant to a discharged system.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Cleaning cloths
Refrigerant R22 (5.5 lbs. 2.5 Kg)
Tools (Paragraph 3-1)
Thermal gloves

Equipment Descriptions

Power OFF
Removed from Shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

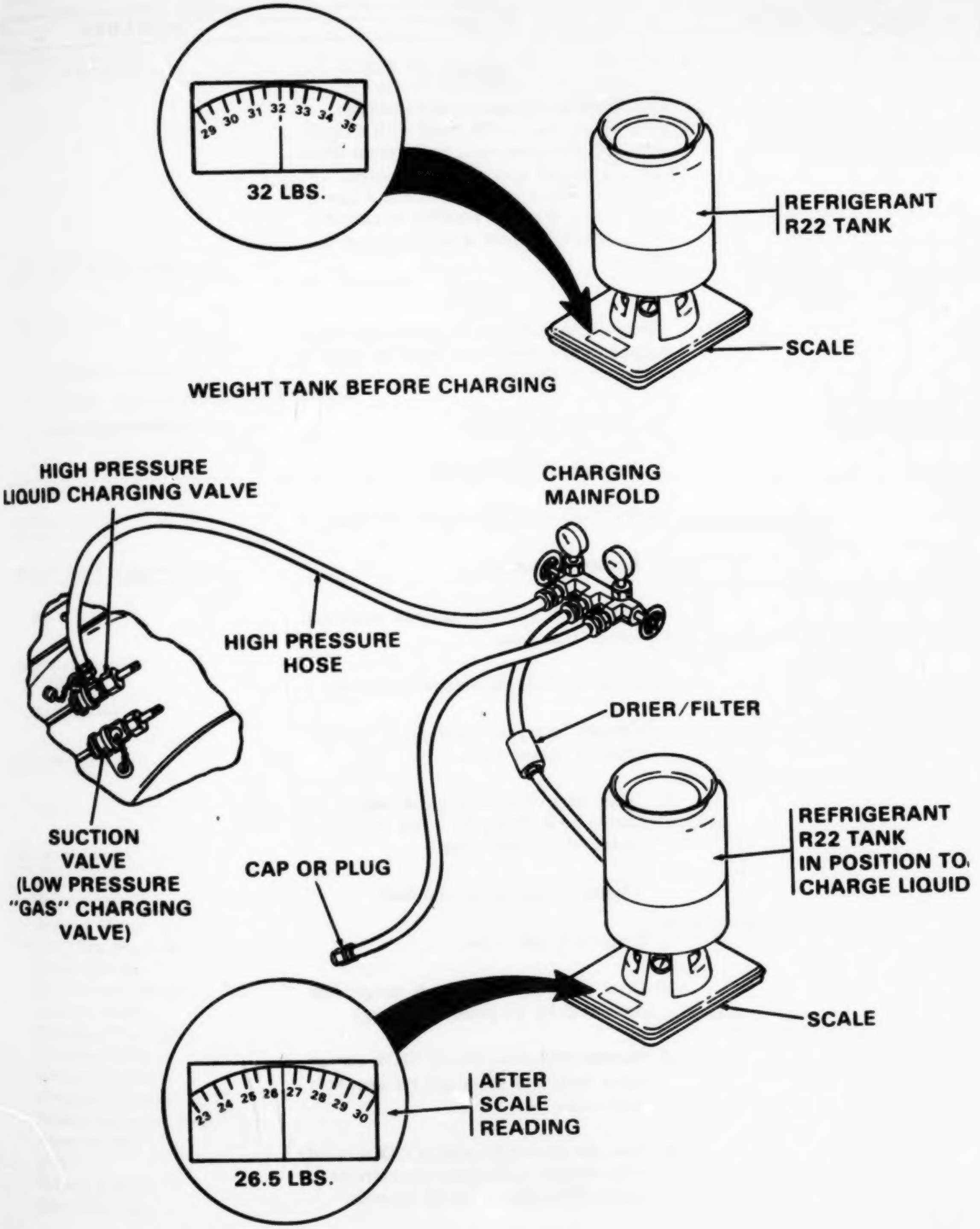
Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS

WARNING

Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation where skin-or-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot metal surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.


29 30 31 32 33 34 35
32 LBS.
REFRIGERANT R22 TANK
SCALE
WEIGHT TANK BEFORE CHARGING
HIGH PRESSURE LIQUID CHARGING VALVE
CHARGING MAINFOLD
HIGH PRESSURE HOSE
DRIER/FILTER
SUCTION VALVE (LOW PRESSURE "GAS" CHARGING VALVE)
CAP OR PLUG
REFRIGERANT R22 TANK IN POSITION TO CHARGE LIQUID
SCALE
23 24 25 26 27 28 29 30
AFTER SCALE READING
26.5 LBS.

A01290
TM5-4120-367-14-38

Figure 6-6. Refrigerant Charging, Liquid

LOCATION/ITEM	ACTION	REMARKS
	NOTE Two kinds of refrigerant drums are in general use. One is equipped with a single shut-off valve, and must be inverted when charging liquid refrigerant. The other is equipped with a vapor valve and a liquid valve which makes it possible to charge either liquid or vapor when the drum is upright.	
	NOTE Whenever the refrigerant system has been opened, a new filter-drier must be installed before re-charging.	
CHARGING	a. Evacuate the system.	Paragraph 6-6.
	b. Use only R22 refrigerant.	. . .
	c. Set drum with valve down on scale.	. . .
	d. Record the weight.	. . .
	e. Subtract 5.5 lbs (2.5 kg) and mark dial face at that point.	. . .
	f. Connect charging manifold to drum.	. . .
	g. Connect charging manifold to high (head) pressure valve.	. . .
	h. Open refrigerant tank valve slightly and loosen hose fitting for a few seconds at manifold to purge hose.	. . .
	i. Tighten fitting at the manifold.	. . .
	j. Open high side valve.	. . .
	k. Open tank valve until tank weight has decreased by 5.5 pounds. (2.5 kg)	. . .
	l. Immediately close HIGH SIDE service valve, manifold valve and refrigerant tank valve.	. . .
	m. Run the air conditioner in COOL mode with temperature control in extreme COOLER position for 15 minutes.	. . .

LOCATION/ITEM	ACTION	REMARKS
CHARGING	n. Check liquid sight indicator. If system is short of refrigerant, gas bubbles will appear regularly in the indicator.	. . .
	o. If refrigerant system is undercharged, add additional refrigerant...see paragraph 6-7.	. . .

6-9 COMPRESSOR

This task covers

a. Safety Measures
b. Diagnosing Compressor Motor Burnout
c. Cleaning after burnout

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Acid test kit

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Rubber gloves
Drier/filter (2)

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
SAFETY MEASURES	a. Serviceman should be aware of acid burns.	. . .
	b. When testing for odor, release a small amount of gas and smell it cautiously to avoid inhalation of toxic decomposed products.	. . .
	c. When discharging gas or liquid refrigerant from a burnout, avoid eye-or-skin-contact with the product.	. . .
	d. If the entire charge is to be removed, it should be discharged outside any enclosure.	. . .
	e. Do not discharge refrigerant near an open flame.	. . .
	f. Wear rubber gloves to avoid acid burns when handling sludge from a burned out compressor.	. . .
	WARNING Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation where skin-or-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot metal surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.	
	CAUTION The electronic leak detector is sensitive to the presence of refrigerant gas in the atmosphere. When refrigerant gas is present in the atmosphere of the work area, false indications can result. Use in a well ventilated but draft-free area.	
DIAGNOSING COMPRESSOR MOTOR BURNOUT	a. Simple failure, without motor burnout, does not require extensive cleaning of entire refrigerant system that burnout requires.	. . .
	b. Motor burnout indicates other problems have contributed to the failure.	. . .

LOCATION/ITEM	ACTION	REMARKS
DIAGNOSING COMPRESSOR MOTOR BURNOUT	c. These problems must be corrected or avoided to prevent repetition of the burnout.	. . .
	d. A compressor motor that fails to start may be due to improper voltage, a faulted motor thermal switch (S8)), a malfunction of the compressor start relay, or a compressor mechanical fault.	. . .
	e. Make certain that a burnout has occurred by doing the following:	. . .
	(1) Check for proper voltage.	
	(2) Remove power connector from unit.	. . .
	(3) Check S8 for full continuity between pins D and E on motor plug P-4.	. . .
	(4) Check power at compressor connector by jumping pins D and E.	. . .
	(5) Remove the compressor leads at the compressor side of the start relay.	. . .
	(6) Close the disconnect switch to energize the control circuit.	. . .
	(7) Check for voltage on all lines at both the line and load side of the compressor relay K3.	. . .
	NOTE Before checking the compressor motor, make sure the compressor and crankcase heater are cool to the touch. Otherwise, a false indication may be obtained due to internal motor protectors being open.	
	(8) Check the compressor motor to see if it is electrically grounded or open.	. . .
	(9) A 500 volt megger or an ohmmeter can be used for making the test.	. . .
	(10) Megger reading is at least 5 megohms.	. . .
	f. After removal of a bad compressor from the refrigeration system, remove all external tubing and tip the compressor toward the discharge port to drain a small quantity of oil into a clear glass container.	. . .
	g. If the oil is clean and clear, and does not have an acrid smell, the compressor did not fail because of motor burnout.	. . .

LOCATION/ITEM	ACTION	REMARKS
	h. If the oil is black, contains sludge and has an acrid odor, the compressor failed because of motor burnout.	. . .
	i. If a burnout has occurred, the refrigeration system must be cleaned to prevent residual contaminants from causing repeated burnouts.	. . .

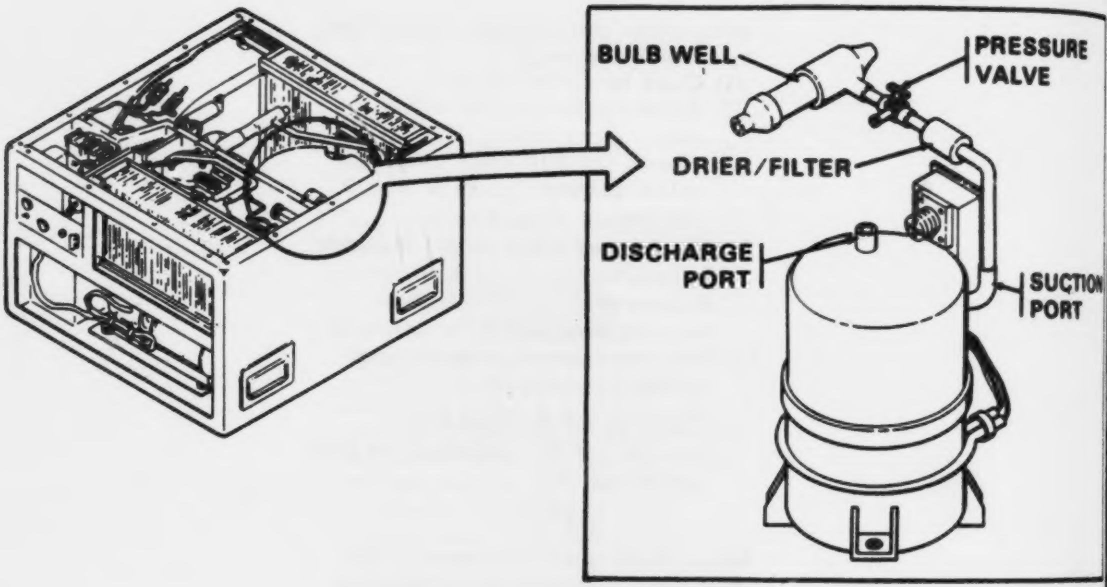
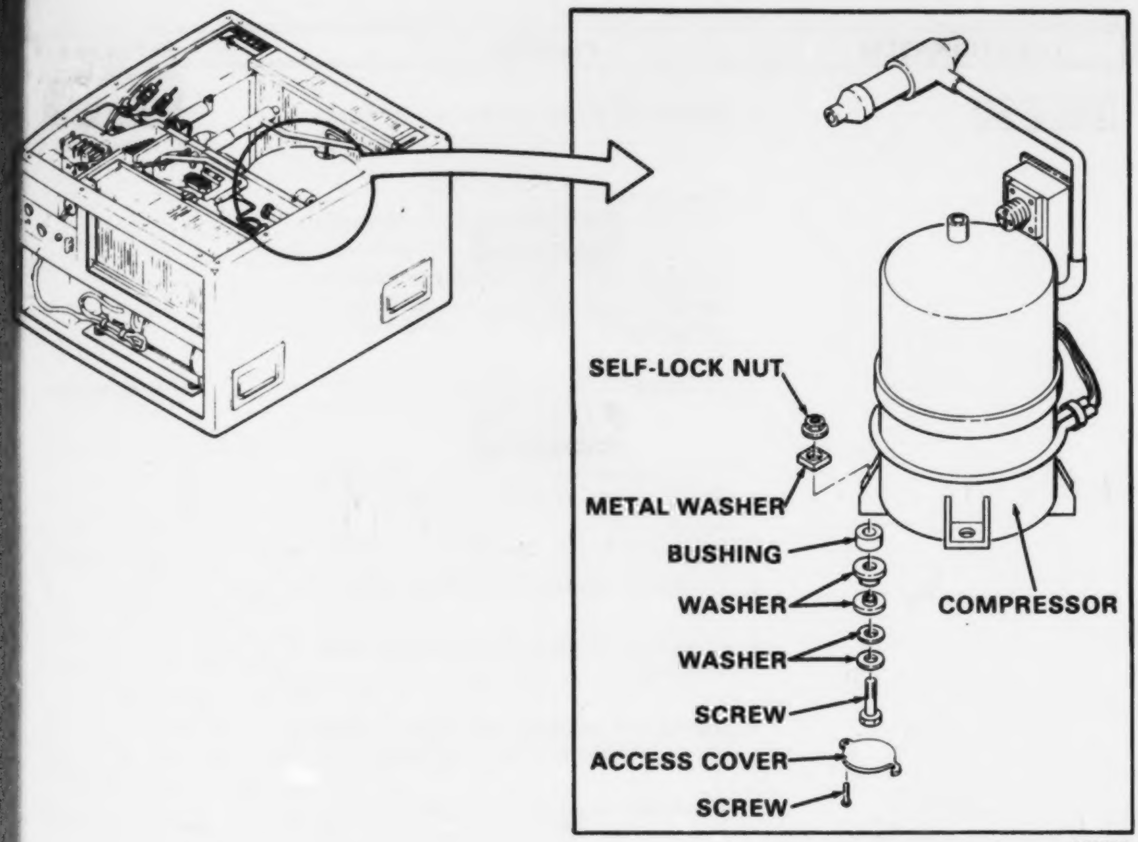


Figure 6-7. Compressor Burnout Cleanup

LOCATION/ITEM	ACTION	REMARKS
CLEANUP PROCEDURES	a. System must be cleaned thoroughly to remove all contaminants.	If not, a repeat burnout will occur.
	b. Discharge refrigerant from system.	Paragraph 6-4 Wear rubber gloves.
	c. Nitrogen purge both high and low sides of system.	Paragraph 6-5
	d. Remove and install new drier/filter.	Paragraph 6-15.
	e. Install new drier/filter in suction line.	Use same drier/filter as used in system.
	f. Install "pressure tap" (valve) between bulbwell and suction line drier/filter.	

LOCATION/ITEM	ACTION	REMARKS
	g. Check the expansion valve and clean or replace it.	Paragraph 6-17.
	h. Replace sight glass	Paragraph 6-14.
	i. Remove the burned out compressor and install the replacement.	Paragraph 6-9.


SELF-LOCK NUT
METAL WASHER
BUSHING
WASHER
WASHER
SCREW
ACCESS COVER
SCREW
COMPRESSOR

A01292
TM5-4120-367-14-40

Figure 6-8. Compressor Replacement

LOCATION/ITEM	ACTION	REMARKS
	j. Evacuate the system	Paragraph 6-6.
	k. Recharge the system and put in operation.	Paragraph 6-8.
	l. Check pressure drop across the new suction drier after one hour of operation. Change, if necessary, and evacuate system.	Between new valve and low side charging valve, no more than 3 psig difference is permitted.
	m. After 8 to 24 hours of operation, change suction drier/filter. Check odor and color of oil. Evacuate system.	. . .
	n. After 14 days of operation, check color acidity of oil. If required, change drier/filter. Before clean up is completed, it is essential that oil is clean and no acid is present.	. . .

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Disconnect power supply.	**WARNING** High voltage can kill.
	b. Remove top covers.	. . .
	WARNING Avoid contact with refrigerant. Acid burns could result from contact with refrigerant.	
	c. Discharge refrigerant system.	Paragraph 6-4.
	WARNING It may be necessary to wait for crankcase heater to cool. Heater can cause severe burns.	
	d. Disconnect electrical connector.	. . .
	e. Unsolder or if necessary cut tubing at the compressor.	. . .
	f. Loosen two screws in each of four access covers on bottom of air conditioner.	. . .
	g. Move four access covers to one side.	. . .
	h. Remove four sets of screws, washers, bushings, and nuts.	Save for installation. Inspect bushing and washers. It may be necessary to order new for installation.
	WARNING If compressor is being removed due to burnout, use care when lifting to avoid touching compressor sludge. Acid in sludge can cause burns.	
	i. Lift compressor from air conditioner.	. . .
INSTALLATION	**CAUTION** If compressor is being replaced due to motor burnout, decontaminate system.	Failure to follow caution will result in failure of new compressor.
	a. Nitrogen purge both high and low sides of system.	Paragraph 6-5.
	b. Perform previous "Cleanup procedures" located in this paragraph.	For burnout only.
	c. Inspect removed washers and bushings; use new if they are deformed or worn.	. . .

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	d. Install four mounting screws, flat washers, and washers and bushings.	. . .
	CAUTION Compressor solder tube connections are factory sealed to prevent moisture or dirt contamination of compressor. Do not remove plugs until compressor is to be connected to refrigerant tubing.	
	e. Discard plastic plugs from compressor solder connections.	. . .
	NOTE If refrigeration piping was disconnected with the compressor being replaced, transfer the piping to the replacement compressor before installing it in the air conditioner.	
	f. Lift compressor and slowly lower down onto the four sets of mounting hardware.	. . .
	g. Secure compressor in place using washers and selflocking nuts.	. . .
	h. Solder refrigerant tubing to compressor. See paragraph 6-3.	**NOTE** Dry nitrogen is always used to purge the refrigeration system before brazing or debrazing connections, in order to prevent internal oxidation and scaling.
	CAUTION Do not use new compressor to draw vacuum on system.	
	i. Evacuate the system	Paragraph 6-6.
	j. Connect compressor electrical connector.	. . .
	k. Charge system with 5.5 pounds (2.5 kg) of refrigerant R-22.	Paragraph 6-8.
	l. Replace covers.	. . .
	m. Connect power supply.	. . .

6-10. COMPRESSOR CRANKCASE HEATER

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Cleaning cloths
Tools (Paragraph 3-1)

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

' See WARNING page

References

None

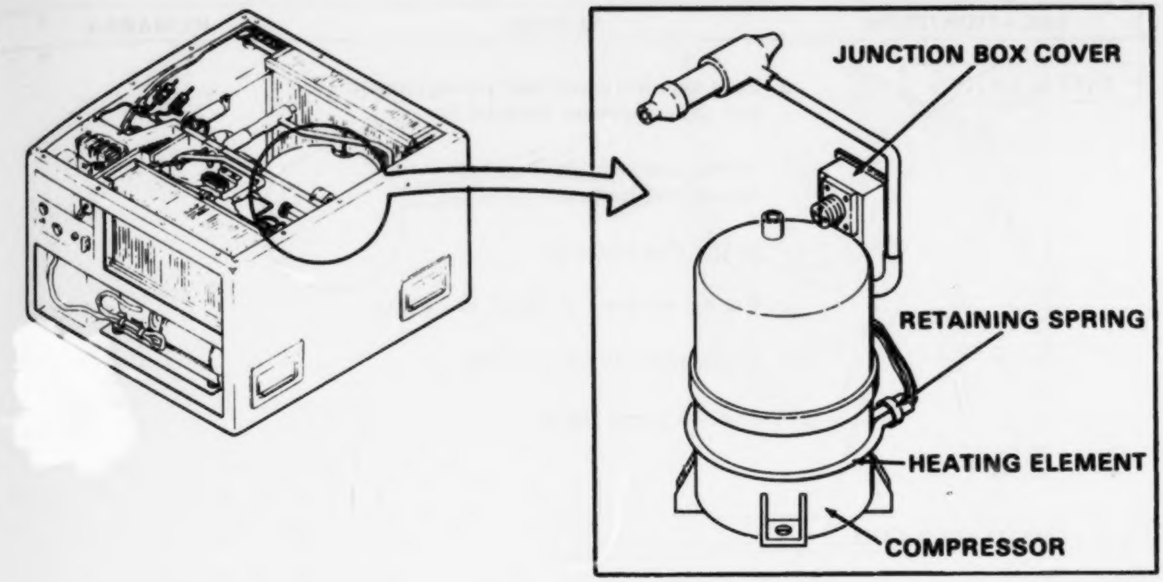
Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Discharge refrigerant	Paragraph 6-4.
	b. Disconnect power supply	**WARNING** High voltage can kill.
	c. Remove all three top covers. **CAUTION** Check that compressor and heater are cool. Either or both can cause severe burns.	. . .
	d. Remove the retaining spring from the ends of the crankcase heating element. Remove compressor junction box cover.	. . .



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TM5-4120-367-14-41

Figure 6-9. Crankcase Heater

LOCATION/ITEM	ACTION	REMARKS
	NOTE One lead is spliced to compressor switch S9 and the other lead is connected to the compressor connector.	
REMOVAL	e. Tag and unsolder wire lead from heating element.	. . .
	f. Spring the ends of the heating element apart slightly so that the heating element can be maneuvered around and over the top of the compressor housing to remove it	. . .
INSTALLATION	a. Maneuver the crankcase heating element over the top of the compressor, and down to the lower part of the compressor housing.	. . .
	b. Do not spread the ends of the heating element any more than necessary.	. . .
	c. Install retaining spring over both ends of the heating element to hold it in position.	. . .

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	d. Lead electrical wires from heating element into the compressor junction box.	. . .
	e. Slide a one-inch length of heat-shrink tubing over leads.	. . .
	f. Solder wire junctions.	. . .
	g. Use hot air dryer to shrink the tubing.	. . .
	h. Install cover on junction box.	. . .
	i. Connect power supply	. . .

6-11. CONDENSER COIL

This task covers: a. Cleaning b. Removal c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

- Brazing Flux
- Brazing Alloy
- Charging Manifold
- Safety glasses
- Brazing and Soldering Set
- Solvent PD680
- Detergent Solution
- Cleaning cloths
- Refrigerant (cylinder)
- Nitrogen R22
- Tools (Paragraph 3-1)
- Abrasive cloth
- Scale
- Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

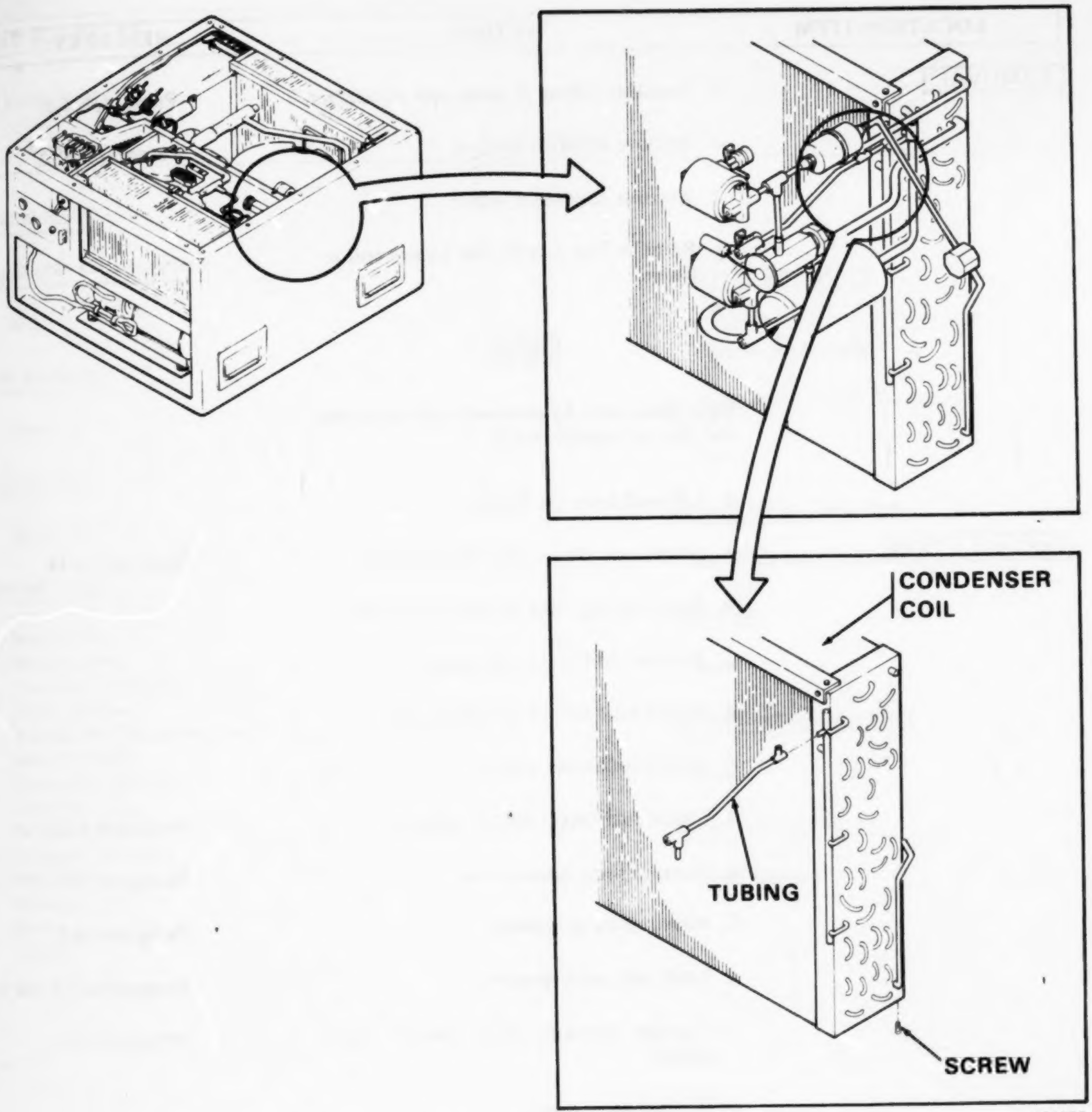
None

Troubleshooting References

None

Personnel Required

Direct support


CONDENSER COIL
TUBING
SCREW

A01294
TM5-4120-367-14-42

Figure 6-10. Condenser Coil

LOCATION/ITEM	ACTION	REMARKS
CLEANING	a. Refer to paragraph 5-25	. . .
REMOVAL	a. Discharge refrigerant	Paragraph 6-4.
	b. Remove the top covers.	. . .
	c. Remove compressor	Paragraph 6-9.

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	d. Unsolder tubing at joint near condenser.	Paragraph 6-3.
	e. Remove actuator control.	Paragraph 6-22
	f. Remove condenser guard.	. . .
	g. Remove four screws that secure coil to frame.	. . .
	NOTE Sight glass must be removed with condenser coil (See paragraph 6-13).	
	h. Lift coil from the frame.	. . .
INSTALLATION	a. Install new drier/filter (dehydrator)	Paragraph 6-14.
	b. Install spring nuts on bottom of coil.	. . .
	c. Position coil in air conditioner	. . .
	d. Install four screws to secure coil.	. . .
	e. Install condenser guard.	. . .
	f. Install and adjust louver control.	Paragraph 6-23
	g. Solder tubing connections.	Paragraph 6-3.
	h. Nitrogen purge system.	Paragraph 6-5.
	i. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	j. Charge system with liquid refrigerant.	Paragraph 6-8.
	k. Replace top covers.	. . .

6-12. RECEIVER

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

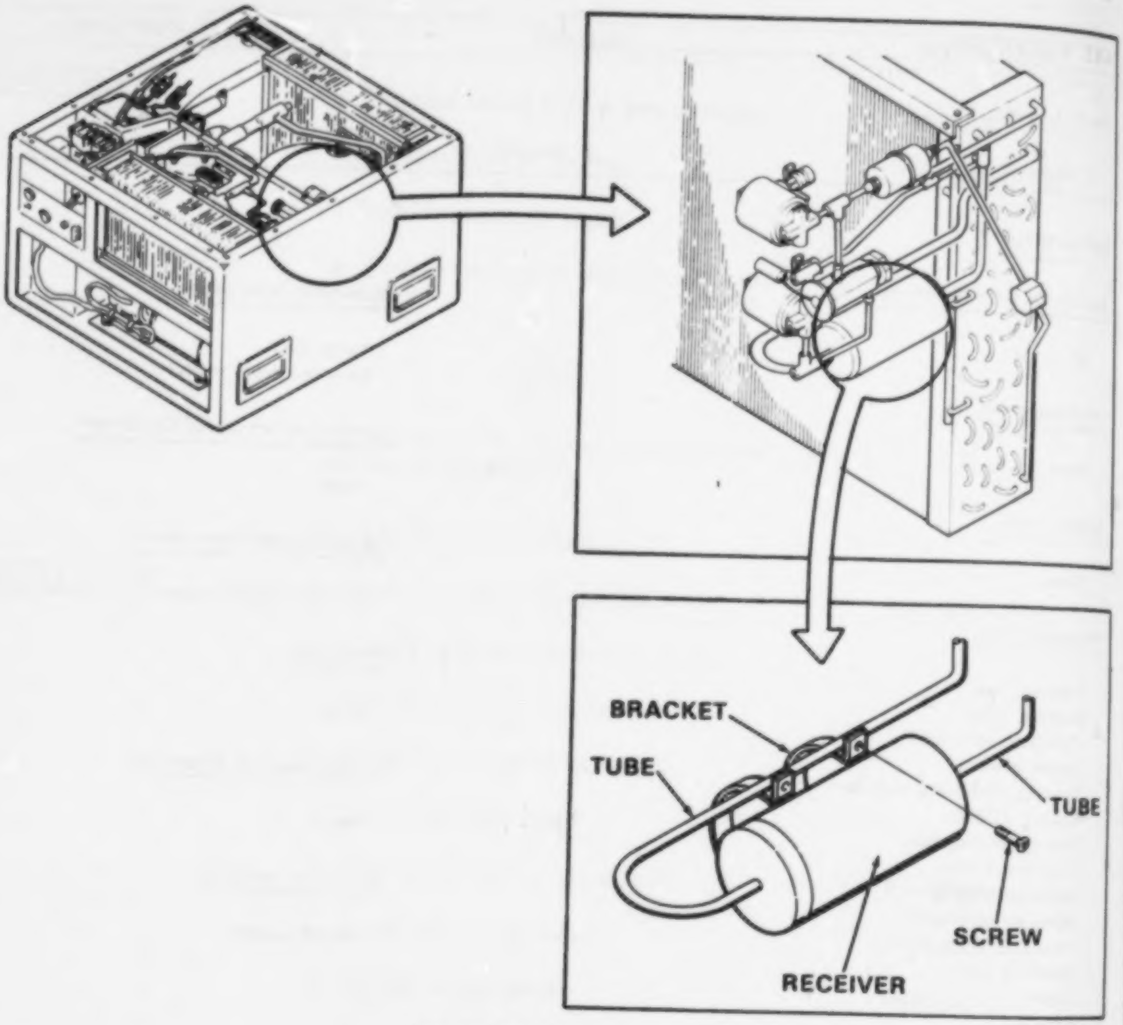


Figure 6-11. Receiver

A01295,
TM5-4120-367-14-43

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Discharge refrigerant.	Paragraph 6-4
	b. Remove the top covers.	. . .
	c. Remove drier/filter.	Paragraph 6-14.
	d. Remove four screws and two mounting straps.	
	e. Remove quench valve.	Paragraph 6-26.
	f. Remove solenoid valves.	Paragraph 6-15.
	g. Unsolder tubing to pull receiver from frame	Paragraph 6-3.

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. Install new drier/filter (dehydrator)	Paragraph 6-14
	b. Solder tubing to receiver	Paragraph 6-3
	c. Install two straps	. . .
	d. Install all removed items.	. . .
	e. Nitrogen purge system.	Paragraph 6-4
	f. Leak test and evacuate.	Paragraphs 6-2 and 6-4.
	g. Charge system with liquid refrigerant	Paragraph 6-8
	h. Replace covers.	

6-13. SIGHT GLASS

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

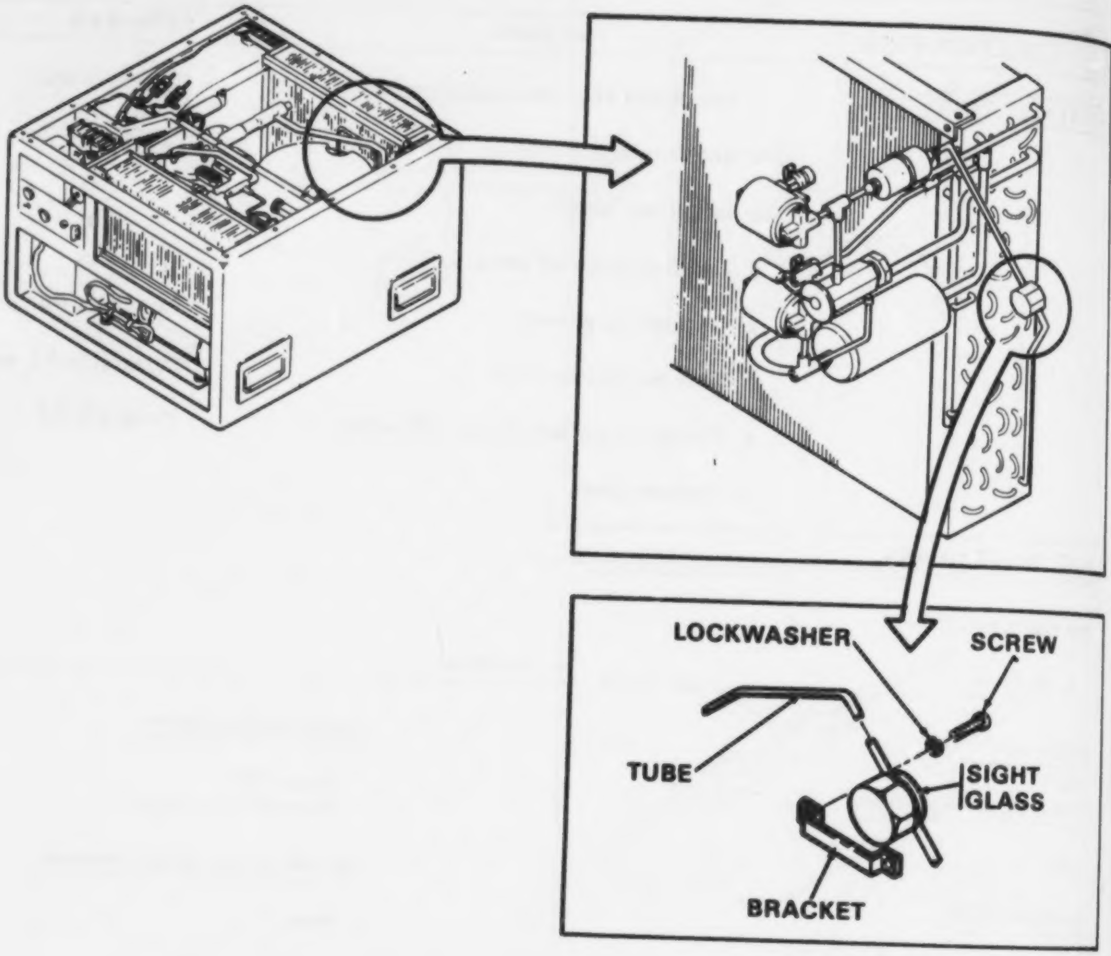
None

Troubleshooting References

None

Personnel Required

Direct support


LOCKWASHER
SCREW
TUBE
SIGHT GLASS
BRACKET

A01284
TM5-4120-367-14-44

Figure 6-12. Sight Glass

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Discharge refrigerant.	Paragraph 6-4.
	b. Remove top covers.	. . .
	c. Remove connector on inside of unit from input power connector J11.	. . .
	d. Remove two screws and lockwashers.	. . .
	e. Remove mounting bracket from inside housing.	. . .
	f. Remove condenser coil and sight glass as an assembly.	Paragraph 6-11.
	g. Unsolder sight glass from tubing.	Paragraph 6-3.
INSTALLATION	a. Install new drier/filter (dehydrator).	Paragraph 6-14.
	b. Solder sight glass to condenser.	Paragraph 6-3.
	c. Install condenser coil.	Paragraph 6-11.
	d. Place bracket over sight glass on inside of housing.	. . .
	e. Secure bracket with two screws and lockwashers.	. . .
	f. Nitrogen purge system.	Paragraph 6-4.
	g. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	h. Charge system with liquid refrigerant.	Paragraph 6-8
	i. Replace covers.	. . .

LOCATION/ITEM	ACTION	REMARKS

6-14. DRIER/FILTER (DEHYDRATOR)

This task covers:

a. Removal
b. Cleaning
c. Inspection
d. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

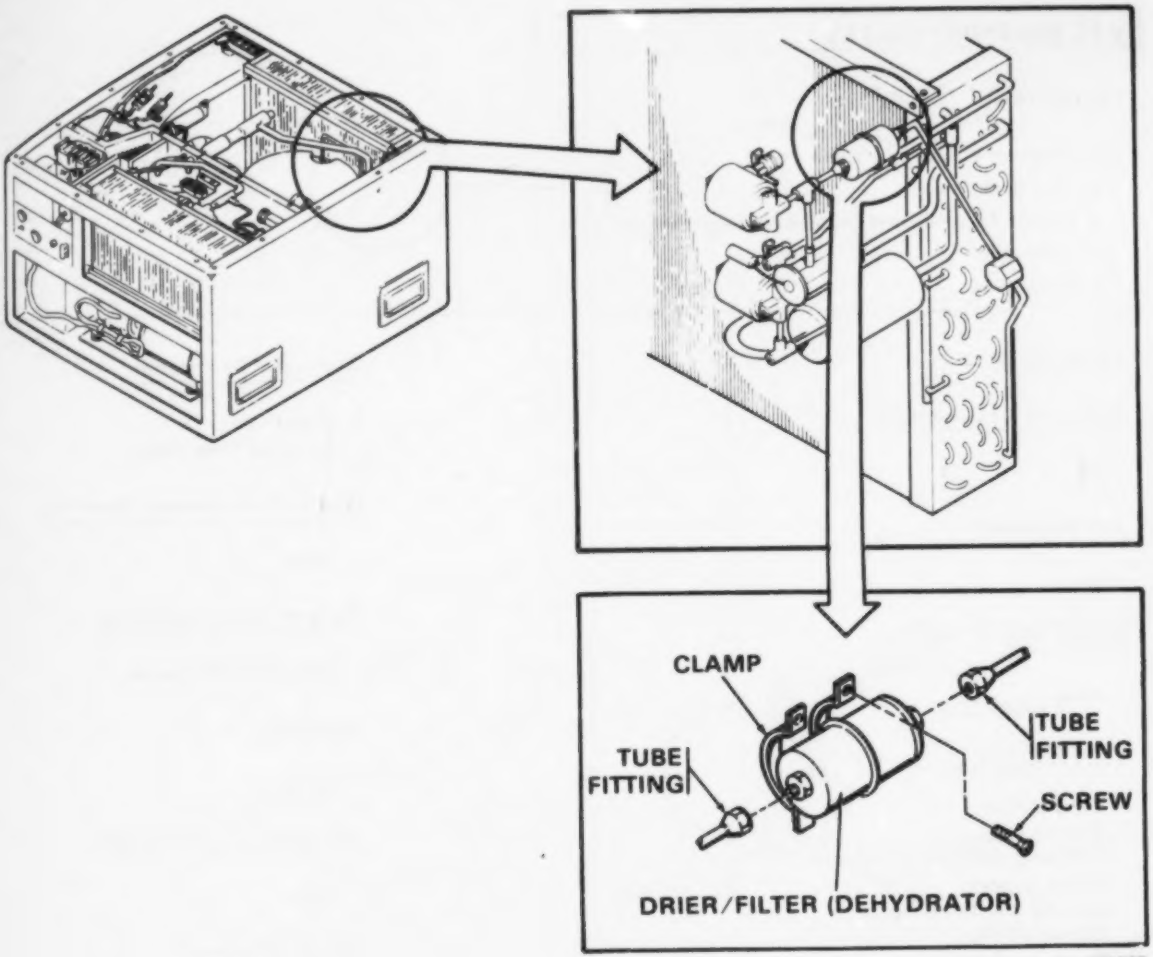
Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Discharge refrigerant	Paragraph 6-4
	b. Remove top covers	. . .
	c. Remove four screws and two straps	. . .
	d. Disconnect drier tube from refrigerant lines	. . .


CLAMP
TUBE FITTING
TUBE FITTING
SCREW
DRIER/FILTER (DEHYDRATOR)

A01297
TM5-4120-367-14-45

Figure 6-13. Drier/Filter

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. Nitrogen purge system	Paragraph 6-4
	b. Connect drier to tubing	. . .
	c. Install two straps.	. . .
	d. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	e. Charge system with liquid refrigerant.	Paragraph 6-8
	f. Replace covers.	. . .

6-15. SOLENOID VALVES

This task covers:

a. Removal of Solenoid Valve
b. Coil Replacement
c. Bonnet Assembly and Diaphragm Replacement
d. Cleaning
e. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

- Brazing Flux
- Brazing Alloy
- Charging Manifold
- Safety glasses
- Brazing and Soldering Set
- Solvent PD680
- Detergent Solution
- Cleaning cloths
- Refrigerant R22
- Nitrogen (cylinder)
- Tools (Paragraph 3-1)
- Abrasive cloth
- Scale
- Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

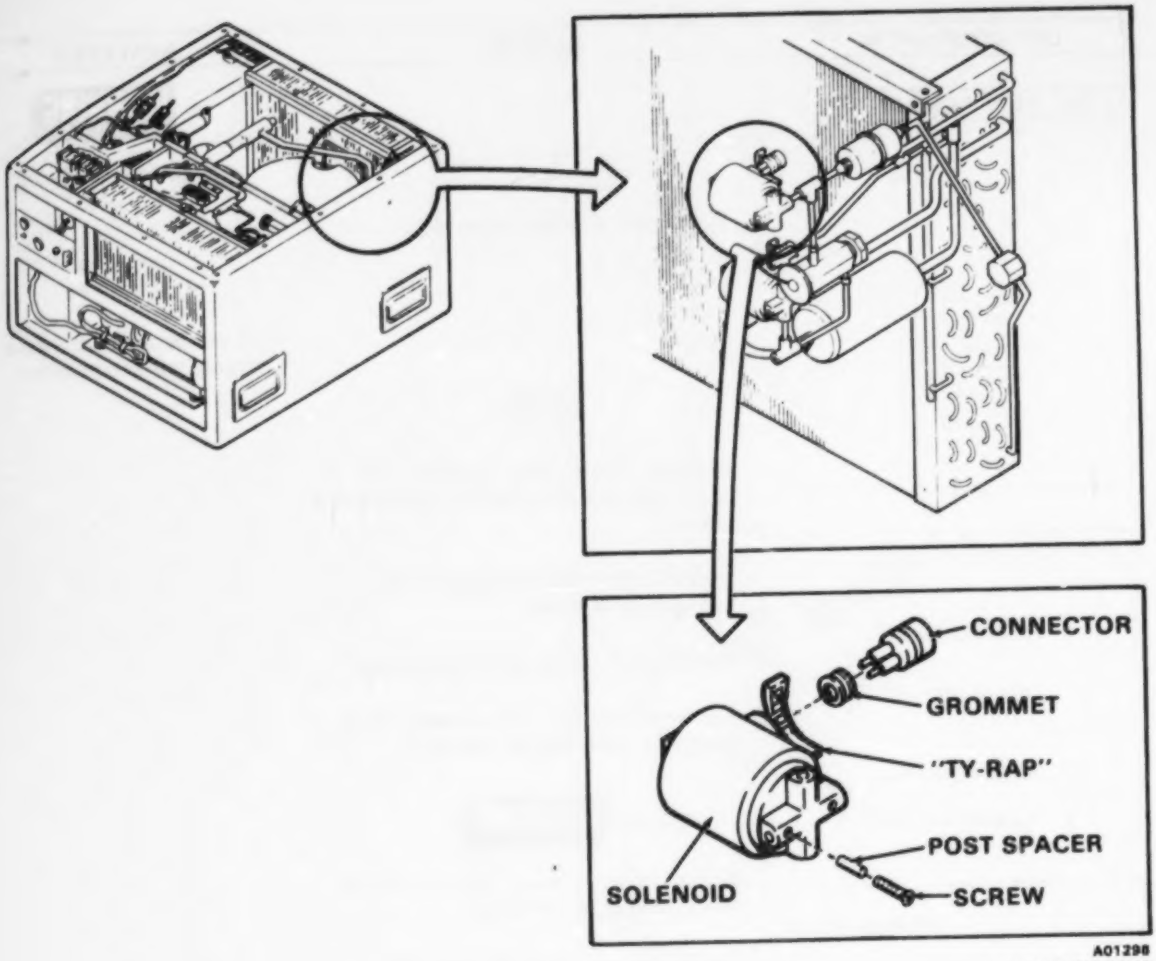
None

Personnel Required

Direct support

NOTE

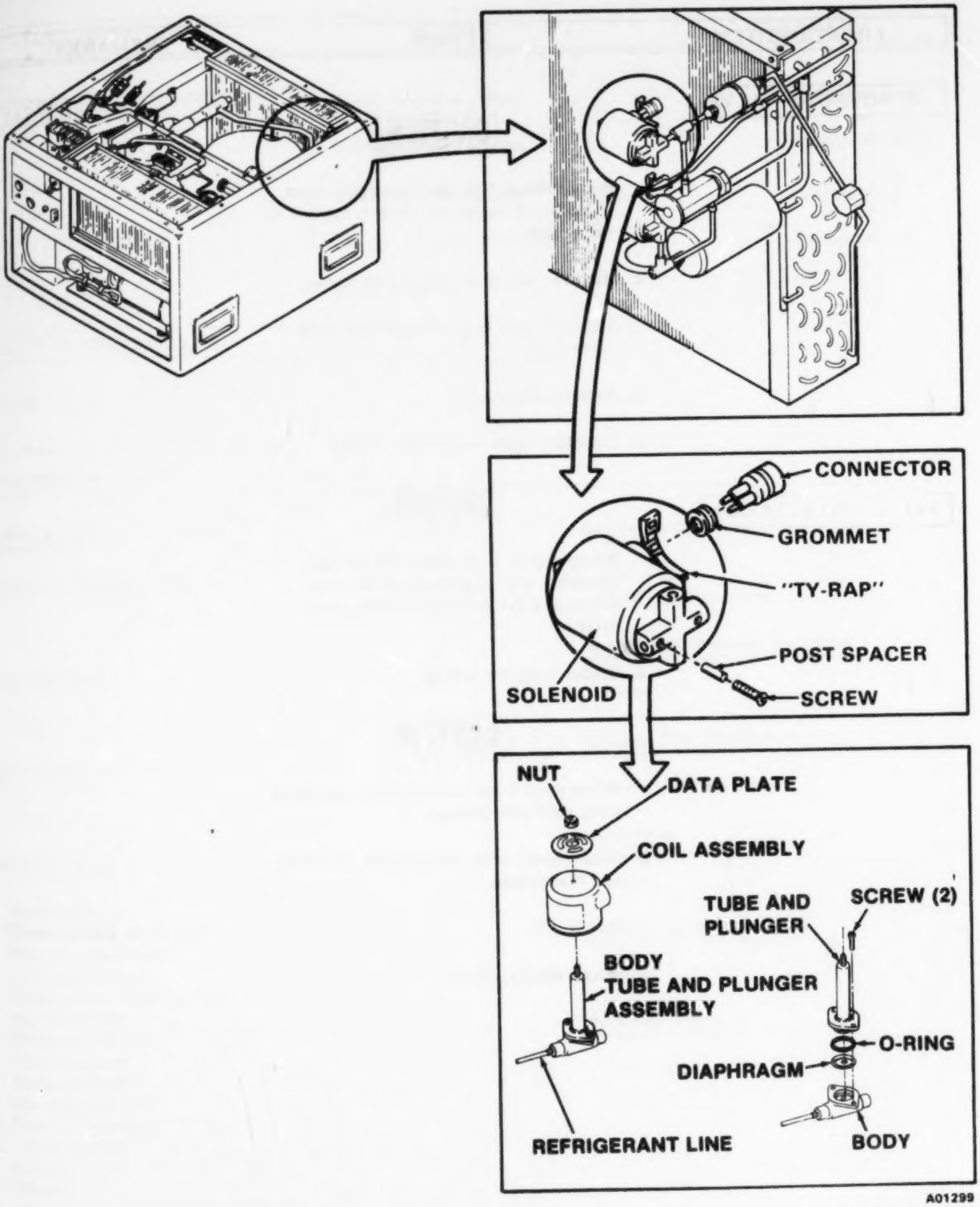
Replaceable parts are the coil, bonnet assembly, diaphragm and preformed packing.


CONNECTOR
GROMMET
"TY-RAP"
POST SPACER
SOLENOID
SCREW

A01298
TM5-4120-367-14-46

Figure 6-14. Solenoid Valve

LOCATION/ITEM	ACTION	REMARKS
COIL REPLACEMENT		**WARNING** High voltage can kill.
	a. Disconnect all power from unit.	. . .
		NOTE Coil can be replaced without discharging refrigerant system.
	NOTE Removal, disassembly, cleaning, and inspection are the same for both solenoid valves.	
	b. Remove electrical connector from solenoid valve leads.	. . .
	c. Remove nut on top of valve housing.	. . .
	d. Lift data plate and coil assembly from body tube and plunger assembly.	. . .
	WARNING System under pressure. Do not remove tube and plunger assembly.	. . .
	e. Install new coil assembly, data plate, and nut.	. . .
	f. Connect electric wiring.	. . .
REMOVAL OF VALVE		**WARNING**
	a. Disconnect all power to unit.	High voltage can kill.
	b. Discharge refrigerant.	Paragraph 6-4.
	c. Remove top covers.	. . .
	d. Disconnect solenoid valve electrical connector.	. . .


CONNECTOR
GROMMET
"TY-RAP"
POST SPACER
SOLENOID
SCREW
NUT
DATA PLATE
COIL ASSEMBLY
TUBE AND PLUNGER
SCREW (2)
BODY
TUBE AND PLUNGER ASSEMBLY
O-RING
DIAPHRAGM
REFRIGERANT LINE
BODY

A01299
TM5-4120-367-14-47

Figure 6-15. Solenoid Valve Disassembly

LOCATION/ITEM	ACTION	REMARKS
REMOVAL OF VALVE	**CAUTION** **Body tube and plunger assembly must be removed before any heat is applied to valve body.**	
	e. Remove two socket-head cap screws.	. . .
	f. Carefully pull tube and plunger from valve body.	. . .
	g. Remove diaphragm.	. . .
	h. Unsolder valve body from tubing.	. . .
VALVE INSTALLATION	**CAUTION** **Remove coil, body tube and plunger assembly, and diaphragm from new solenoid valve before soldering onto tubing.**	
	a. Solder body on tubing.	. . .
	CAUTION **Allow valve body to cool before installing body tube and plunger.**	
	b. Install body, tube and plunger assembly, and diaphragm.	. . .
	c. Install coil.	See "Coil Replacement."
	d. Install electric wiring.	. . .

LOCATION/ITEM	ACTION	REMARKS
VALVE INSTALLATION	e. Install new drier/filter.	Paragraph 6-14.
	f. Nitrogen Purge system.	Paragraph 6-5.
	g. Leak test and evacuate	Paragraphs 6-2 and 6-6
	h. Charge refrigerant system.	Paragraph 6-8
	i. Replace covers.	. . .

6-16. EXPANSION VALVE

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves
Thermal mastic (97403) 13216E6210

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

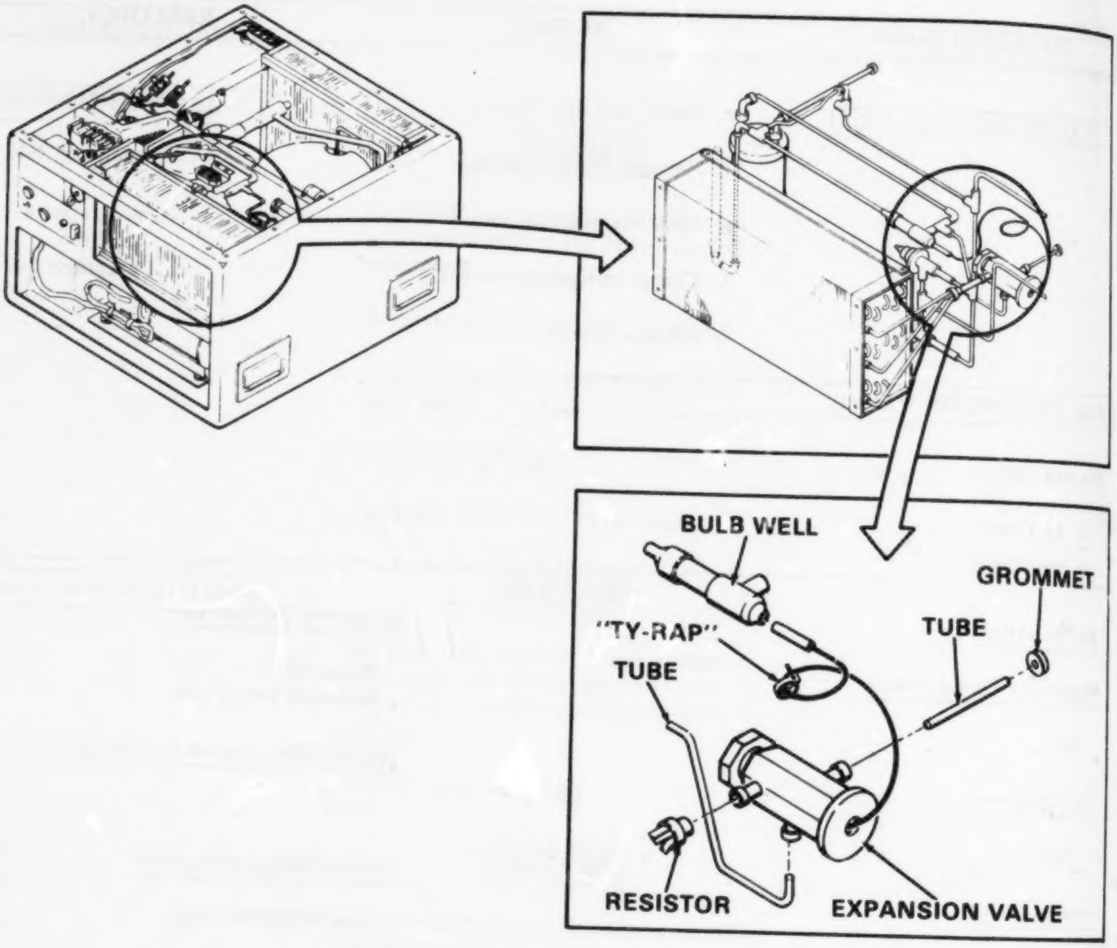
None

Troubleshooting References

None

Personnel Required

Direct support


BULB WELL
GROMMET
"TY-RAP"
TUBE
TUBE
RESISTOR
EXPANSION VALVE

A01300
TM5-4120-367-14-48

Figure 6-16. Expansion Valve

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	**NOTE** The main thermal expansion valve is hermetically sealed and cannot be repaired.	
	a. Discharge the refrigerant system.	Paragraph 6-4
	b. Remove housing top covers.	. . .
	c. Remove mastic from bulb well.	. . .
	d. Remove bulb from well.	. . .
	e. Unsolder thermal expansion valve from tubing and restrictor (distributor).	Paragraph 6-3
INSTALLATION	a. Install new drier/filter.	Paragraph 6-14
	b. Wrap valve with wet rag to prevent overheating valve during soldering.	. . .
	c. Solder valve to tubing and restrictor (distributor).	. . .
	d. Insert approximately one ounce of thermal mastic in bulb well.	. . .
	e. Insert sensing bulb of expansion valve.	. . .
	f. Move bulb back and forth to distribute mastic.	. . .
	g. Set bulb approximately one inch beyond open end.	. . .
	h. Nitrogen purge system.	Paragraph 6-5
	i. Leak test and evacuate.	Paragraphs 6-2 and 6-6
	j. Charge refrigerant system.	Paragraph 6-8
	k. Replace covers.	. . .

6-17. EVAPORATOR COIL

This task covers:

a. Removal
b. Cleaning
c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

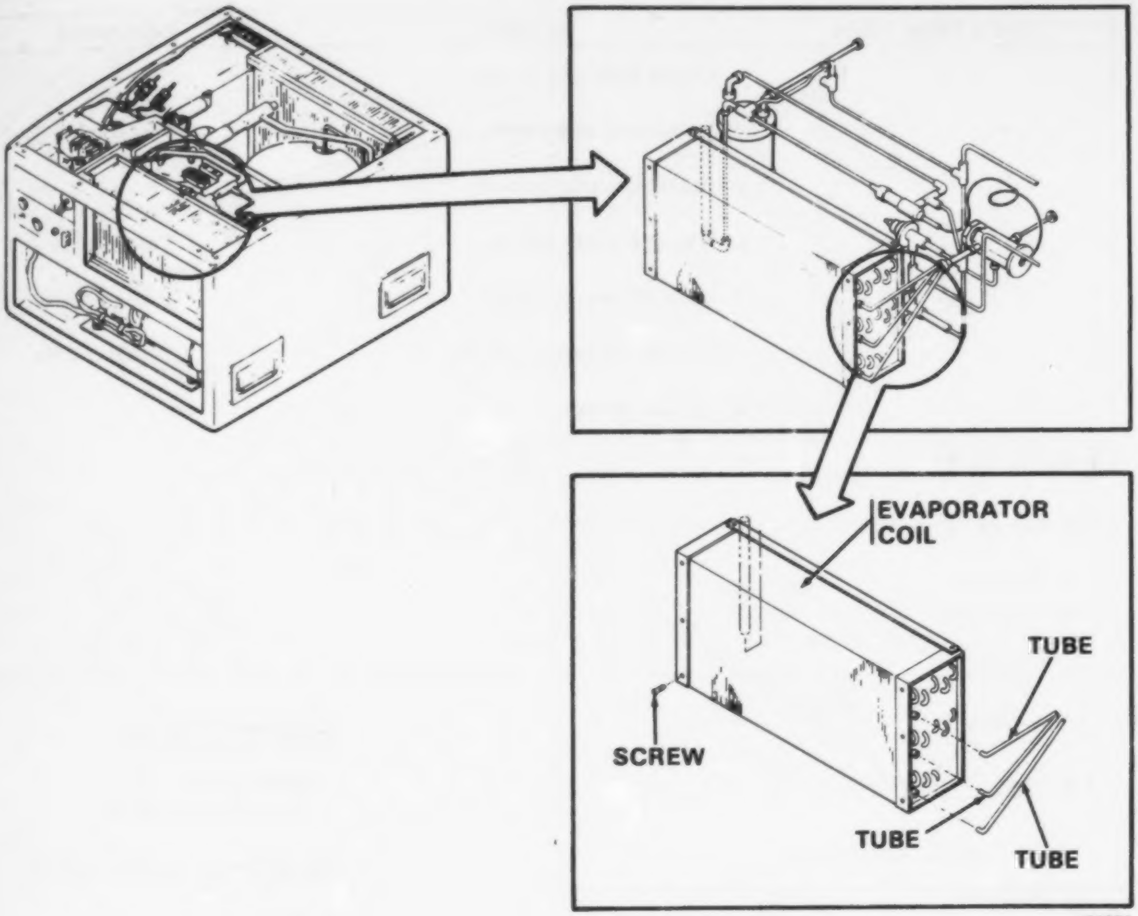
Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
	NOTE Remove restrictor (distributor) with the evaporator coil.	
REMOVAL	a. Discharge refrigerant system.	Paragraph 6-4
	b. Remove top covers.	. . .
	c. Remove evaporator air outlet louver.	. . .
	d. Remove mist eliminator and brackets.	Paragraph 5-20.
	e. Remove bulb well loop clamp.	. . .



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TM5-4120-367-14-49

Figure 6-17. Evaporator Coil

LOCATION/ITEM	ACTION	REMARKS
	f. Unsolder tubing from evaporator coil.	Paragraph 6-3
	g. Remove six screws and lock washers.	. . .
	h. Lift evaporator from frame.	. . .
INSTALLATION	a. Install new drier/filter.	Paragraph 6-14
	b. Install coil in frame.	. . .
	c. Secure with six screws and lock washers.	. . .
	d. Solder tubing to coil.	Paragraph 6-3

LOCATION/ITEM	ACTION	REMARKS
	e. Clamp bulb well to coil.	. . .
	f. Install mist eliminator.	Paragraph 5-20.
	g. Install air outlet louver.	. . .
	h. Nitrogen purge system	Paragraph 6-4
	i. Leak test and evacuate.	Paragraphs 6-2 and 6-6
	j. Charge refrigerant system.	Paragraph 6-8
	k. Replace covers.	. . .

6-18. BULB WELL

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning Cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves
Thermal mastic (97403) 13216E6210

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

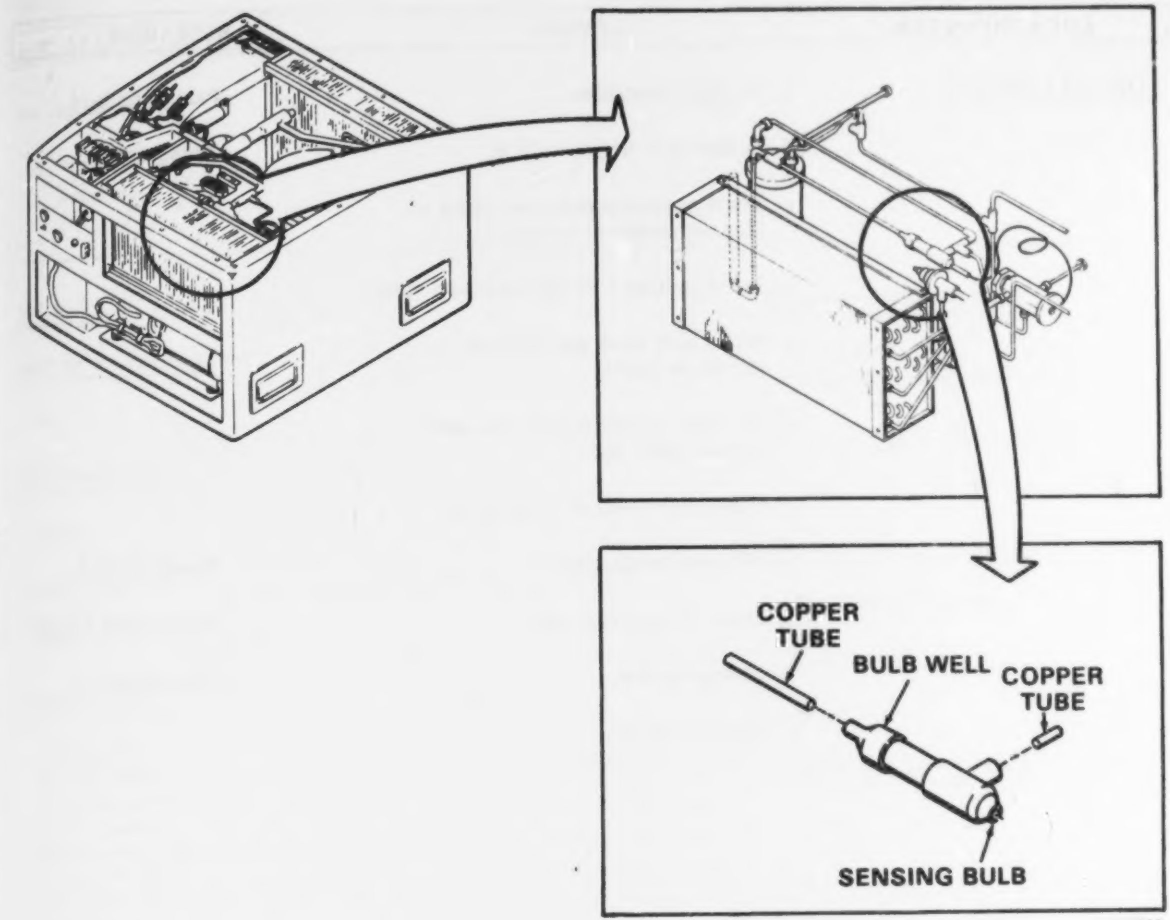
None

Troubleshooting References

None

Personnel Required

Direct support


COPPER TUBE
BULB WELL
COPPER TUBE
SENSING BULB

A01302
TM5-4120-367-14-50

Figure 6-18. Bulb Well

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Release refrigerant charge.	Paragraph 6-4
	b. Remove top covers.	. . .
	c. Remove clamps.	. . .
	d. Remove mastic. **CAUTION** Use care to avoid breaking or kinking sensing line.	. . .
	e. Remove sensing bulb.	. . .
	f. Unsolder bulb well from tubing.	Paragraph 6-3.

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. Replace drier/filter.	Paragraph 6-14.
	b. Solder bulb well to tubing.	Paragraph 6-3.
	c. Insert approximately one ounce of thermal mastic in bulb well.	. . .
	d. Insert sensing bulb of expansion valve.	. . .
	e. Move bulb back and forth to distribute mastic.	. . .
	f. Set bulb approximately one inch beyond open end.	. . .
	g. Clamp bulb well to evaporator.	. . .
	h. Nitrogen purge system.	Paragraph 6-5.
	i. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	j. Charge system.	Paragraph 6-8.
	k. Replace covers.	. . .

6-19. ACCUMULATOR

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

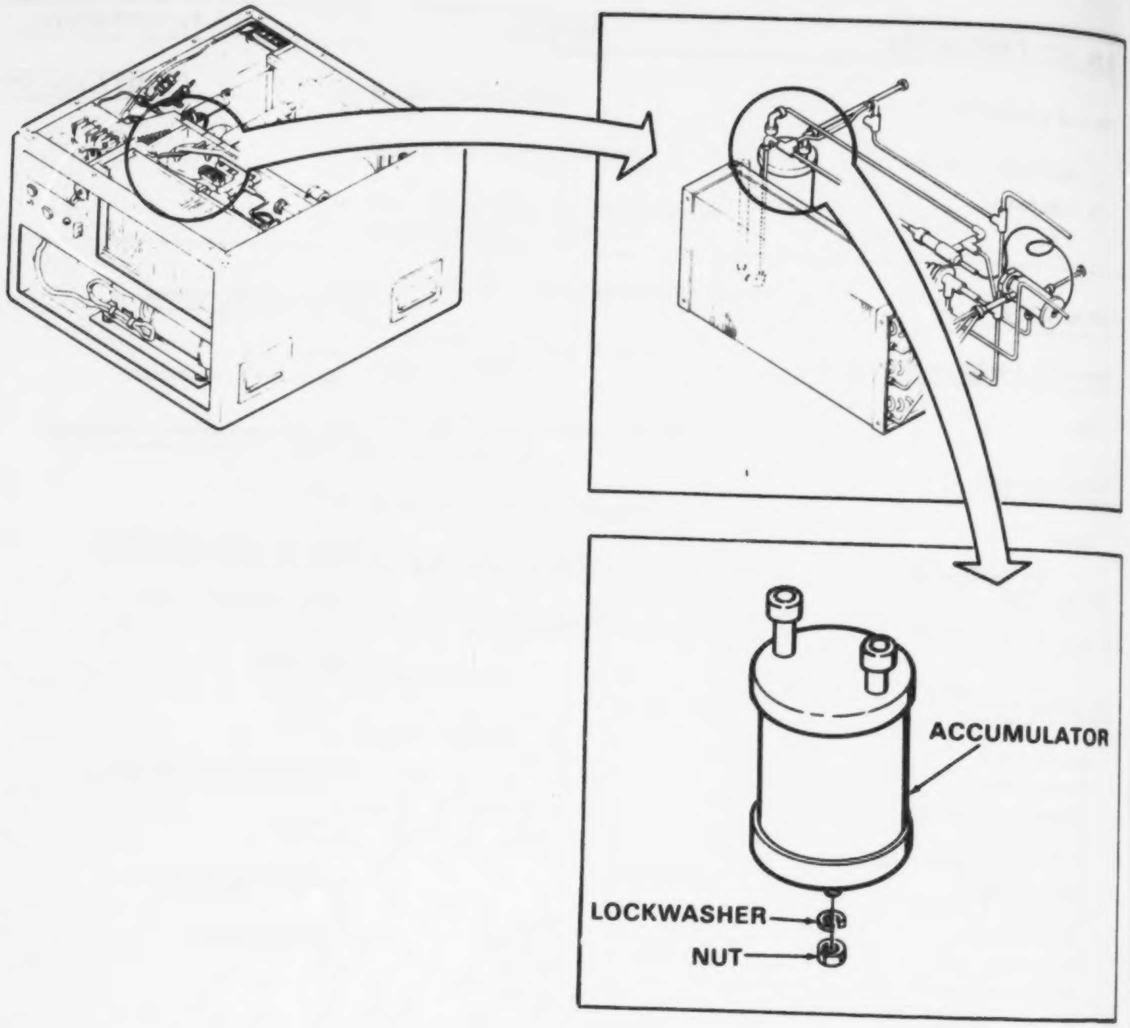
None

Troubleshooting References

None

Personnel Required

Direct support


ACCUMULATOR
LOCKWASHER
NUT

A01303
TM5-4120-367-14-51

Figure 6-19. Accumulator

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Release entire refrigerant charge.	Paragraph 6-4.
	b. Remove top covers.	. . .
	c. Remove air inlet louver.	. . .
	d. Remove nut and lock washer from stud on bottom of accumulator.	. . .
	e. Tag inlet and outlet piping. Disconnect piping.	. . .
	f. Pull accumulator from frame.	. . .
INSTALLATION	a. Install new drier/filter.	Paragraph 6-14.
	b. Install accumulator with stud through hole in bottom of evaporator compartment.	. . .
	c. Install lock washer and nut.	. . .
	d. Connect piping.	Paragraph 6-3.
	CAUTION Inlet and outlet are imprinted with the words "Inlet", "Outlet". Inlet and outlet must be properly connected.	
	e. Install air inlet louver.	. . .
	f. Nitrogen purge system.	Paragraph 6-5.
	g. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	h. Charge refrigerant system.	Paragraph 6-8.
	i. Replace covers.	. . .

6-20. CHARGING VALVES

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

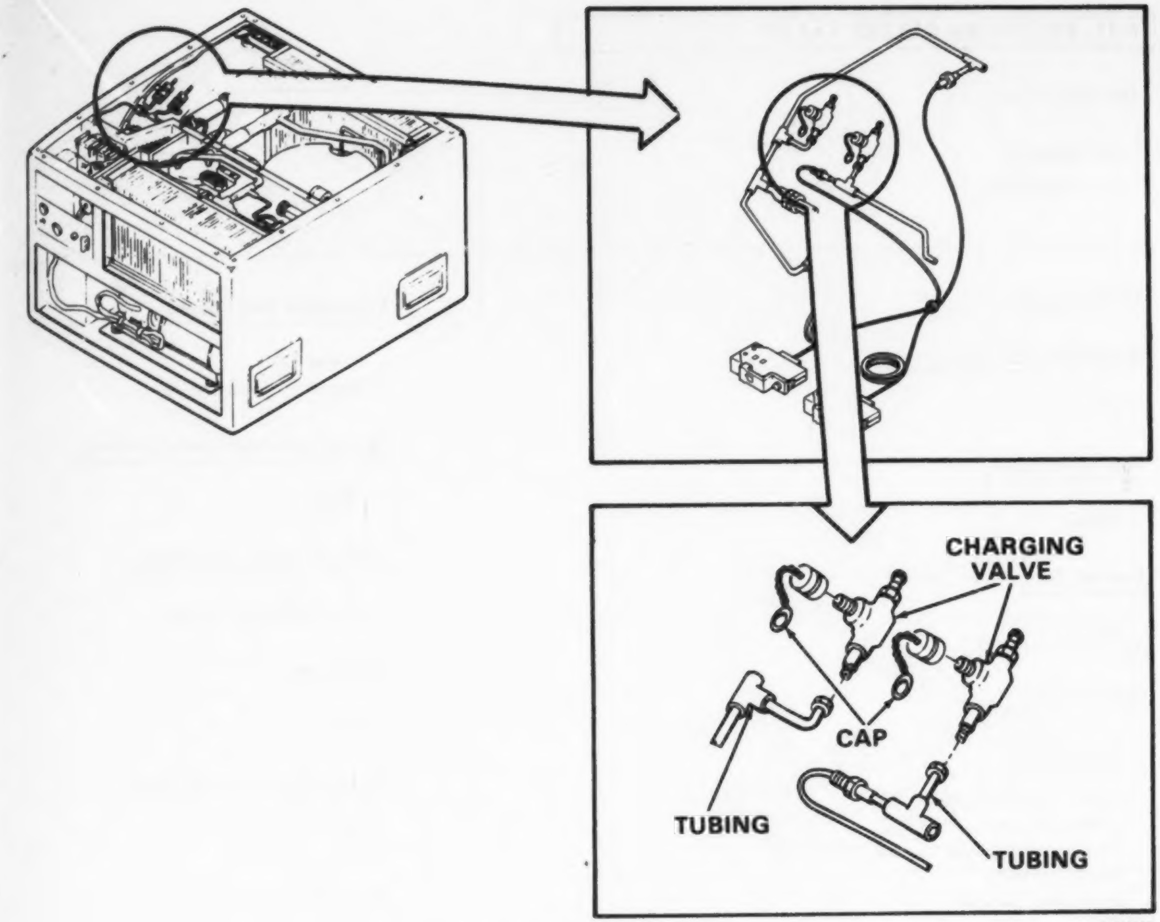
Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Release refrigerant charge.	Paragraph 6-4.
	b. Remove top covers.	. . .
	c. Remove loop clamps.	. . .
	d. Remove valve from system.	. . .
INSTALLATION	a. Install new valve.	. . .
	b. Install loop clamps.	. . .
	c. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	d. Charge refrigerant system.	Paragraph 6-8.
	e. Replace top covers.	. . .


CHARGING VALVE
CAP
TUBING
TUBING

A01304
TM5-4120-367-14-52

Figure 6-20. Charging Valve

6-21. PRESSURE RELIEF VALVE

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

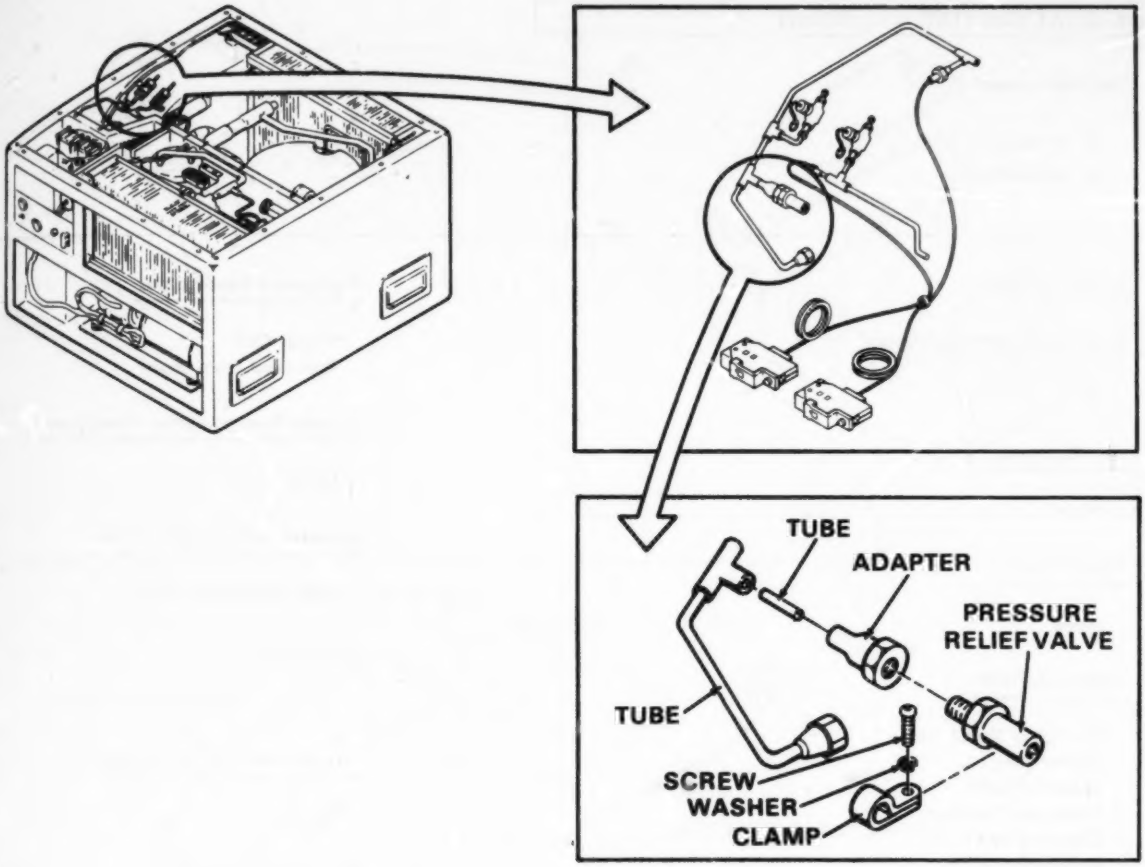
Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Release refrigerant charge.	Paragraph 6-4.
	b. Remove top covers.	. . .
	c. Remove loop clamps.	. . .
	d. Unthread valve from system.	Paragraph 6-3.


TUBE
ADAPTER
PRESSURE RELIEF VALVE
TUBE
SCREW
WASHER
CLAMP

A01305
TM5-4120-367-14-53

Figure 6-21. Pressure Valve

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. Install new drier/filter.	Paragraph 6-14.
	b. Thread valve into system.	Paragraph 6-3.
	c. Install loop clamps.	
	d. Nitrogen purge system.	Paragraph 6-5.
	e. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	f. Charge refrigerant system.	Paragraph 6-8.
	g. Replace covers.	. . .

6-22. ACTUATING CYLINDER

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

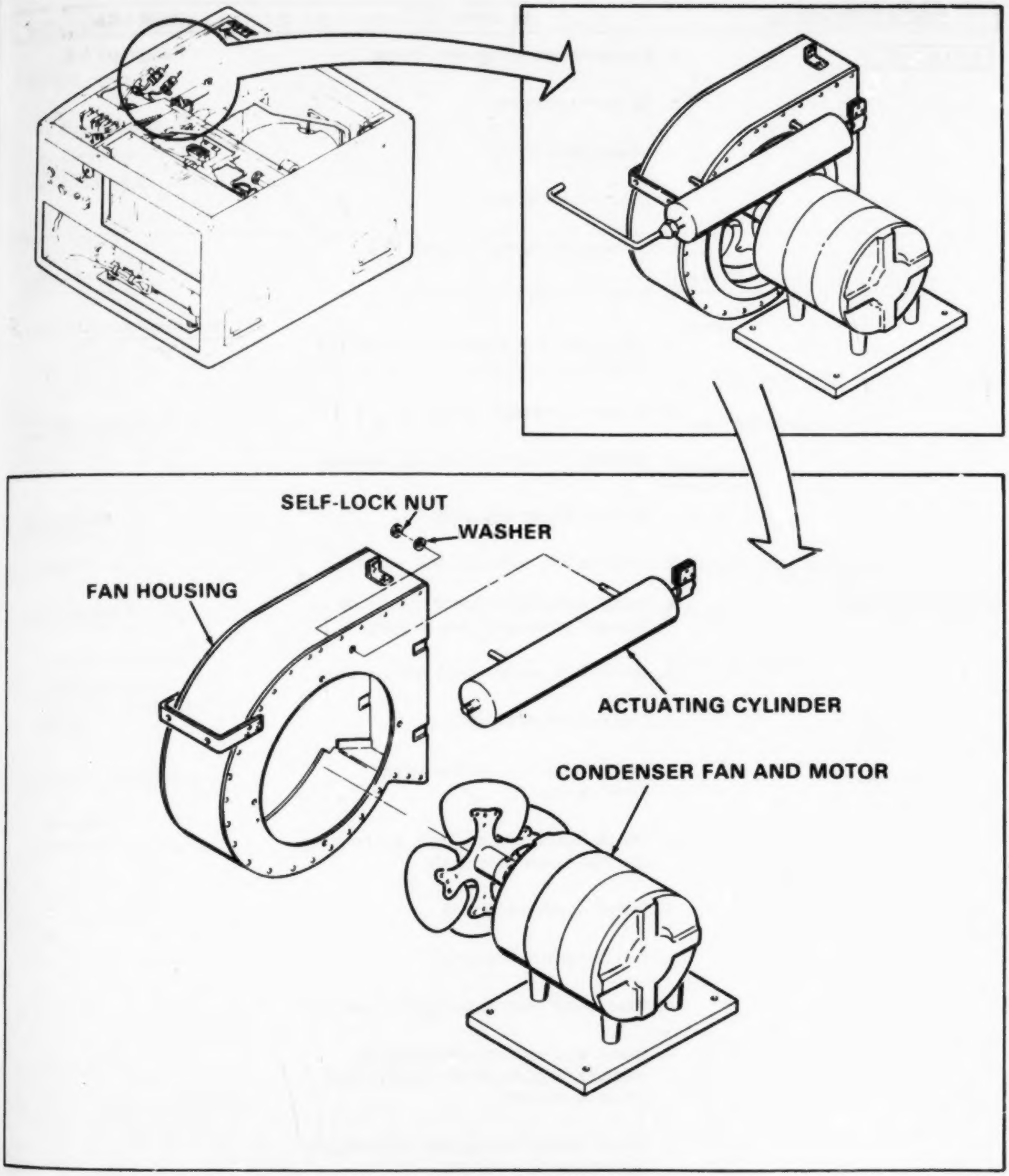
None

Troubleshooting References

None

Personnel Required

Direct support


SELF-LOCK NUT
WASHER
FAN HOUSING
ACTUATING CYLINDER
CONDENSER FAN AND MOTOR

A01306
TM5-4120-367-14-54

Figure 6-22. Actuating Cylinder

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Release entire refrigerant charge.	Paragraph 6-4.
	b. Remove top cover.	. . . .
	c. Loosen post screw.	. . . .
	d. Loosen control wire.	. . . .
	e. Remove casing nuts at each end.	. . . .
	f. Remove push-pull control.	. . . .
	g. Disconnect elbow swivel nut from end of actuator cylinder.	. . . .
	h. Remove condenser guard.	. . . .
	i. Remove five screws and lock washers.	. . . .
	j. Remove louver assembly.	. . . .
	k. Remove two nuts and lock washers.	. . . .
INSTALLATION	a. Install actuating cylinder with studs through openings in fan housing.	. . . .
	b. Install lock washers and nuts on studs.	. . . .
	c. Connect elbow swivel nut.	. . . .
	d. Install condenser air discharge louver assembly.	. . . .
	e. Install five screws and lock washers and two screw base studs.	. . . .
	f. Install condenser guard.	. . . .
	g. Install push-pull control.	. . . .
	h. Place outer control casing nuts over wire.	. . . .
	i. Insert wire ends into openings in mechanical posts on louver lever and actuator cylinder.	. . . .
	j. Install control casing nuts on casing to hold casing in position.	. . . .
	k. Adjust control.	Paragraph 6-23.

NOTE

Control and louver must be adjusted before system is charged with refrigerant.

6-23. CONDENSER LOUVER ADJUSTMENT

This task covers:

a. Replacement
b. Cleaning
c. Adjustment

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Detergent Solution
Cleaning cloths
Tools (Paragraph 3-1)
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

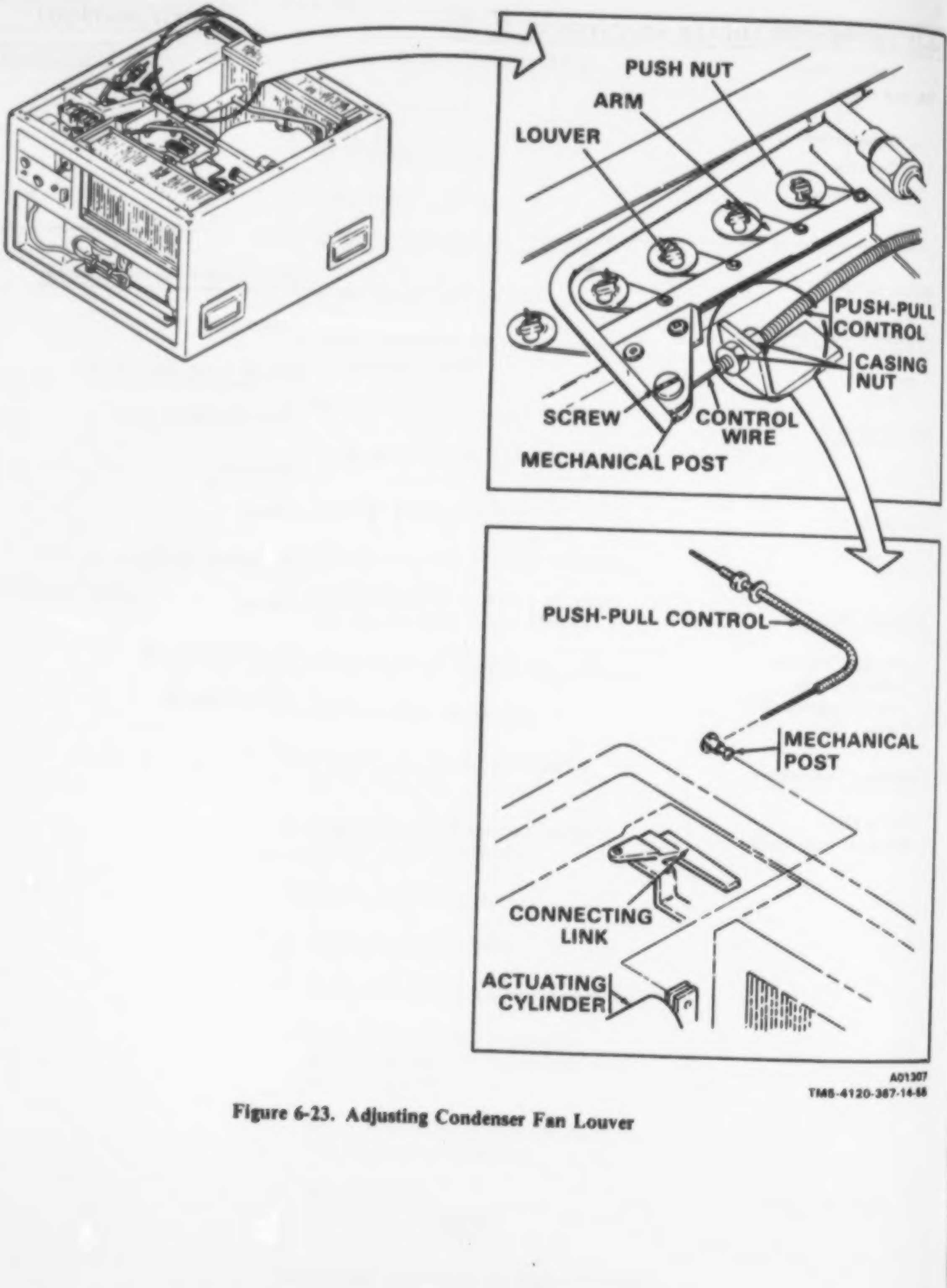
None

Troubleshooting References

None

Personnel Required

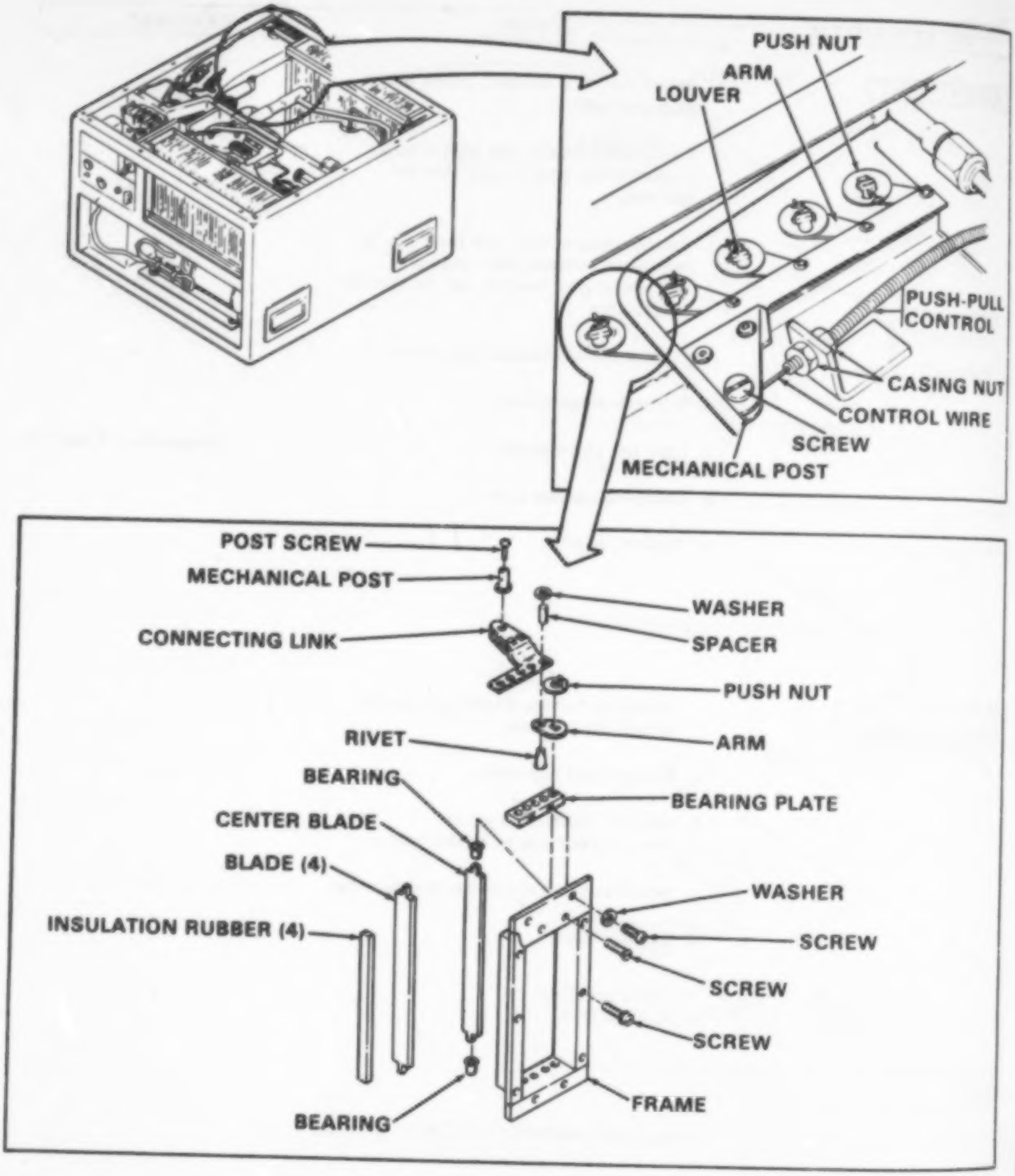
Direct support


PUSH NUT
ARM
LOUVER
PUSH-PULL CONTROL
CASING NUT
SCREW
CONTROL WIRE
MECHANICAL POST
PUSH-PULL CONTROL
MECHANICAL POST
CONNECTING LINK
ACTUATING CYLINDER

A01307
TM5-4120-367-14-55

Figure 6-23. Adjusting Condenser Fan Louver

LOCATION/ITEM	ACTION	REMARKS
ADJUSTMENT	a. Before system is charged, adjust louver push-pull control.	. . .
	b. Close louver blades and tighten screw in mechanical post to lock wire on that end.	. . .
	c. Extend actuator rod until there is a ¼ inch space between inner edge of mechanical post bracket and the face of the cylinder.	. . .
	d. Tighten the mechanical post screw.	. . . .
	e. Nitrogen purge system.	. . . .
	f. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	g. Charge refrigerant system.	. . . .
	h. Replace covers.	. . . .
LOUVER REPLACEMENT	**NOTE** Individual Louver Blades are flexible enough for removal.	
	a. Remove rear top cover.	. . . .
	b. Remove "push-on" type nut from louver blade to be removed.	. . .
	c. Bend blade to remove ends from bearings.	. . . .
	d. Remove Blade	. . . .


PUSH NUT
ARM
LOUVER
PUSH-PULL CONTROL
CASING NUT
CONTROL WIRE
SCREW
MECHANICAL POST
POST SCREW
MECHANICAL POST
WASHER
SPACER
CONNECTING LINK
PUSH NUT
RIVET
ARM
BEARING
BEARING PLATE
CENTER BLADE
BLADE (4)
WASHER
INSULATION RUBBER (4)
SCREW
SCREW
SCREW
FRAME
BEARING

A01300
TM5-4120-367-14-58

Figure 6-24. Removing Condenser Fan Louver

LOCATION/ITEM	ACTION	REMARKS
LOUVER REPLACEMENT	e. Bend new blade in same manner as removal.	. . .
	f. Install end bearings.	. . .
	g. Install "push-on" nut.	. . .
CLEANING	a. Use a clean dry cloth.	. . .
	b. Use detergent solution.	. . .
ADJUSTMENT	a. Turn off air conditioner and wait four hours or until air conditioner is uniformly at ambient temperature or head pressure is below 150 psig (10.516 kg/cm^2)	. . .
	b. Remove rear top cover.	. . .
	c. Loosen mechanical post screw.	
	d. Close condenser louvers.	. . .
	e. Pull wire tight and tighten mechanical post screw.	. . .
	f. Louvers must be tightly closed when air conditioner is off and head pressure is below 150 psig (10.516 kg/cm^2).	. . .

6-24. CONDENSER FAN AND MOTOR

This task covers:

a. Removal
b. Cleaning
c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Safety glasses
Solvent PD680
Detergent Solution
Cleaning cloths
Tools (Paragraph 3-1)
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

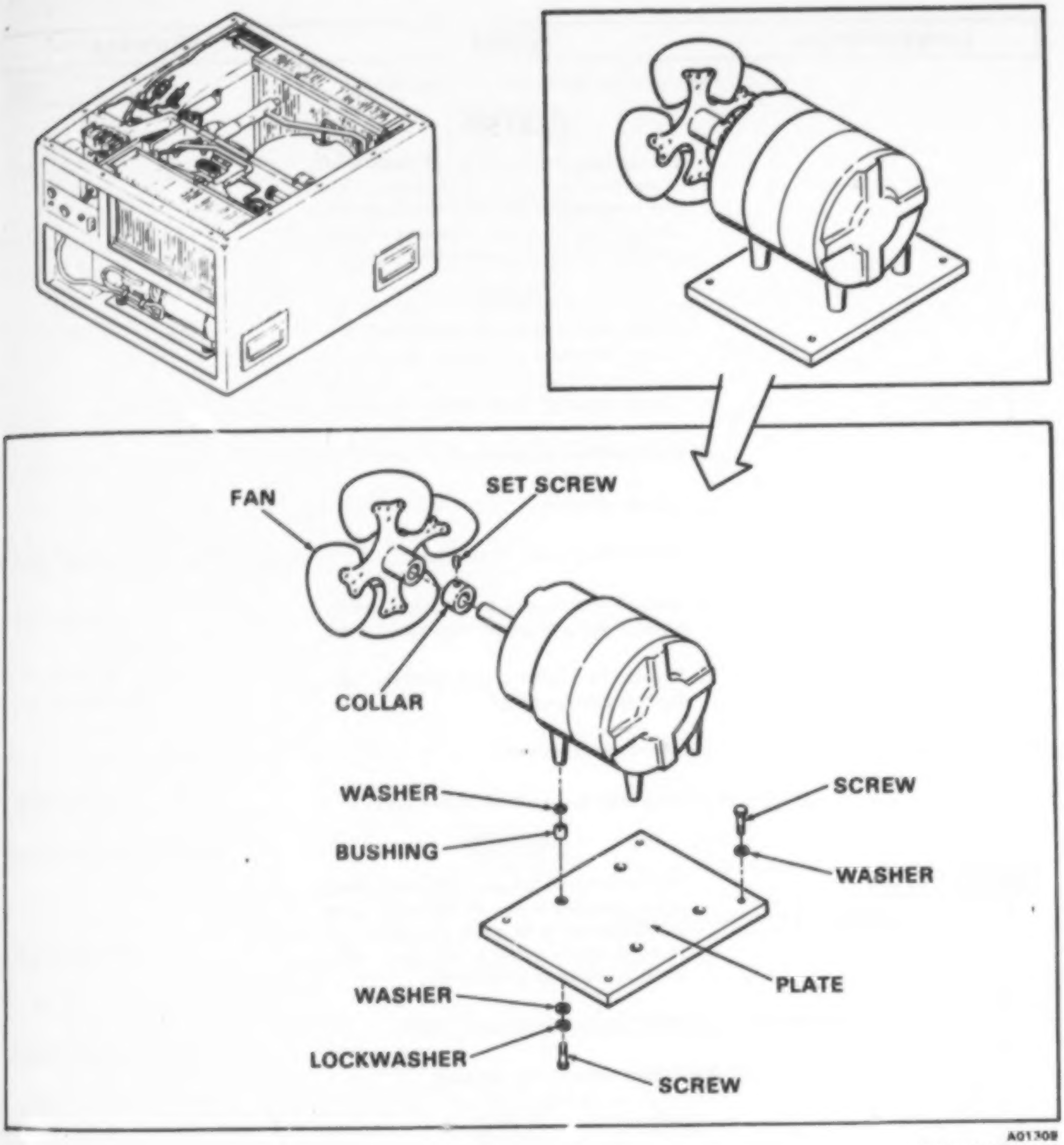
Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		**WARNING**
	a. Remove power from air conditioner.	High voltage can kill.
	b. Disconnect motor electrical connector.	. . .


FAN
SET SCREW
COLLAR
WASHER
BUSHING
SCREW
WASHER
PLATE
WASHER
LOCKWASHER
SCREW

A01308
TM5-4120-367-14-57

Figure 6-25. Condenser Fan and Motor

LOCATION/ITEM	ACTION	REMARKS
	CAUTION Do not hammer fan on or off motor shaft; motor bearings would be damaged. Dress out roughness with a fine file, stone or abrasive cloth. Apply a coating of light machine oil to ease assembly.	
	NOTE If fan only is to be replaced it is not necessary to remove motor.	
	c. Loosen setscrew in fan hub.	. . .
	d. Pull fan from motor shaft.	. . .
	e. Loosen setscrew.	. . .
	f. Pull bushing from motor shaft.	. . .
	g. Remove four screws and washers which secure motor and fan assembly to the frame.	. . .
	h. Remove four screws, lock washers, flat washers and bushings.	. . .
	i. Lift motor from plate.	. . .
	j. See paragraph 6-29 for motor repair.	. . .
INSTALLATION	**CAUTION** Do not hammer fan on or off motor shaft; motor bearings would be damaged. Dress out roughness with a fine file, stone, or abrasive cloth. Apply a coating of light machine oil to ease assembly.	
	a. Slide bushing onto motor shaft.	. . .
	b. Tighten setscrew in bushing.	. . .
	NOTE It may be necessary to trial fit motor mount bushings so that fan will be centered in fan inlet.	
	c. Secure motor and fan to plate using four screws, lock washers, washers and bushings.	. . .
	d. Place motor and plate in the air conditioner frame.	. . .

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	e. Aline keyway in motor shaft with fan key shaft.	. . .
	f. Install key.	. . .
	g. Press fan onto motor shaft.	. . .
	h. Check that fan will be centered in fan inlet.	. . .
	i. If necessary lift fan and motor out and change size of motor mount bushings.	. . .
	j. Secure motor and plate to frame using four screws and washers.	. . .
	k. Connect motor electrical connector.	. . .
	l. Replace top cover.	. . .

6-25. HIGH AND LOW PRESSURE SWITCHES

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

- Charging Manifold
- Safety Glasses
- Cleaning cloths
- Refrigerant R22
- Nitrogen (cylinder)
- Tools (Paragraph 3-1)
- Scale
- Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

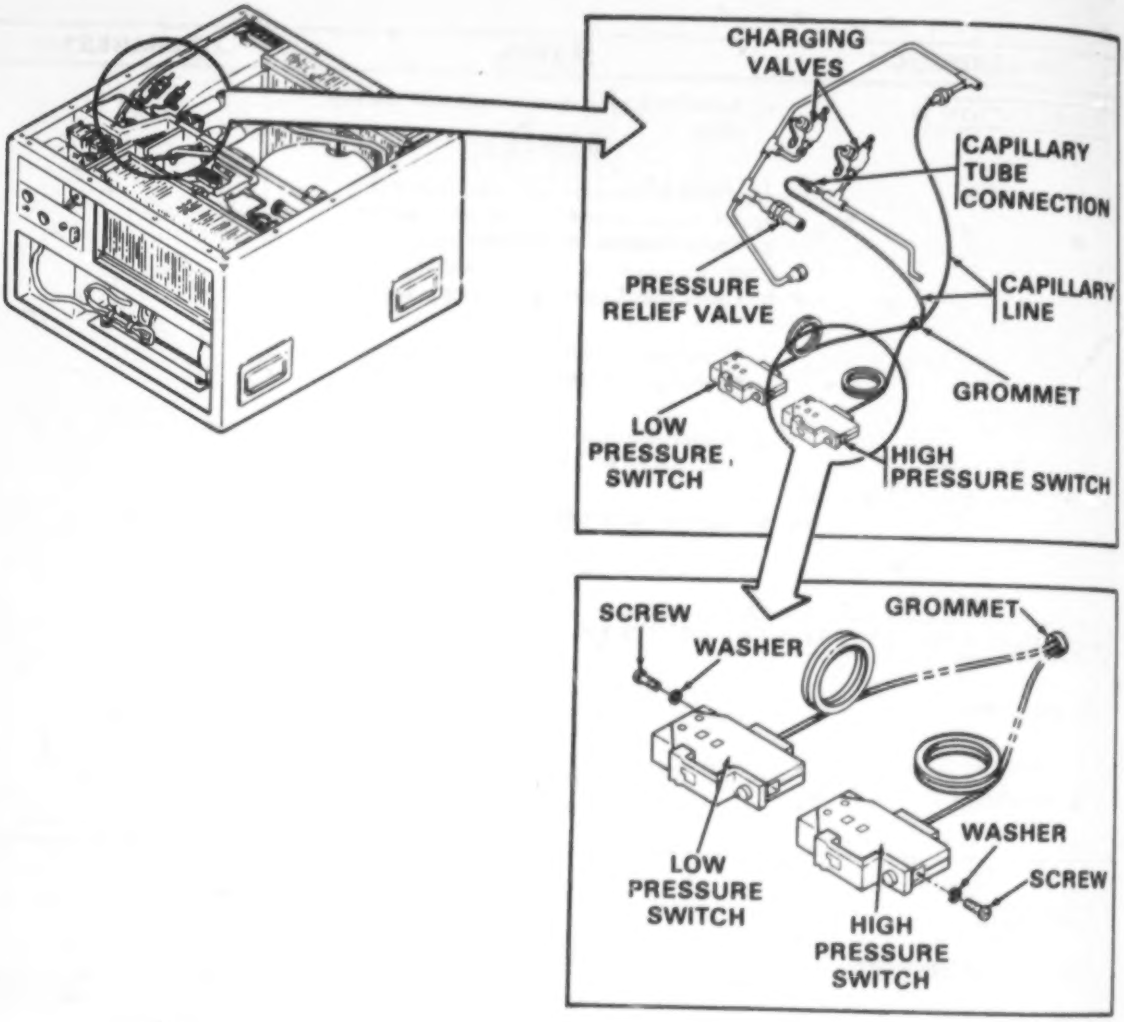
None

Troubleshooting References

None

Personnel Required

Direct support


CHARGING VALVES
CAPILLARY TUBE CONNECTION
CAPILLARY LINE
PRESSURE RELIEF VALVE
GROMMET
LOW PRESSURE, SWITCH
HIGH PRESSURE SWITCH
SCREW
WASHER
GROMMET
WASHER
SCREW
LOW PRESSURE SWITCH
HIGH PRESSURE SWITCH

A01310
TM5-4120-367-14-58

Figure 6-26. High and Low Pressure Switch

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Disconnect electrical power to air conditioner.	**WARNING** High voltage can kill
	b. Discharge refrigerant.	Paragraph 6-4
	c. Pull junction box out of frame.	. . .
	d. Remove two mounting screws and lock washers	. . .

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	e. Disconnect capillary tube connection.	. . .
	f. Tag and disconnect electric wires from switch.	. . .
	g. Pull capillary tube thru grommet.	. . .
	h. Pull switch from air conditioner.	. . .
INSTALLATION	a. Insert capillary tube thru grommet.	. . .
	b. Connect capillary tube to fitting.	. . .
	c. Install switches.	. . .
	d. Secure with two screws and washers.	. . .
	e. Connect electric wires.	. . .
	f. Replace drier/filter.	Paragraph 6-15
	g. Nitrogen purge system.	Paragraph 6-5
	h. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	i. Charge system with liquid refrigerant.	Paragraph 6-8
	j. Replace control panel.	. . .
	k. Replace covers.	. . .
	l. Connect electric power.	. . .
	m. Test air conditioner.	. . .

6-26. QUENCH VALVE

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves
Thermal mastic (97403) 13216E6210

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

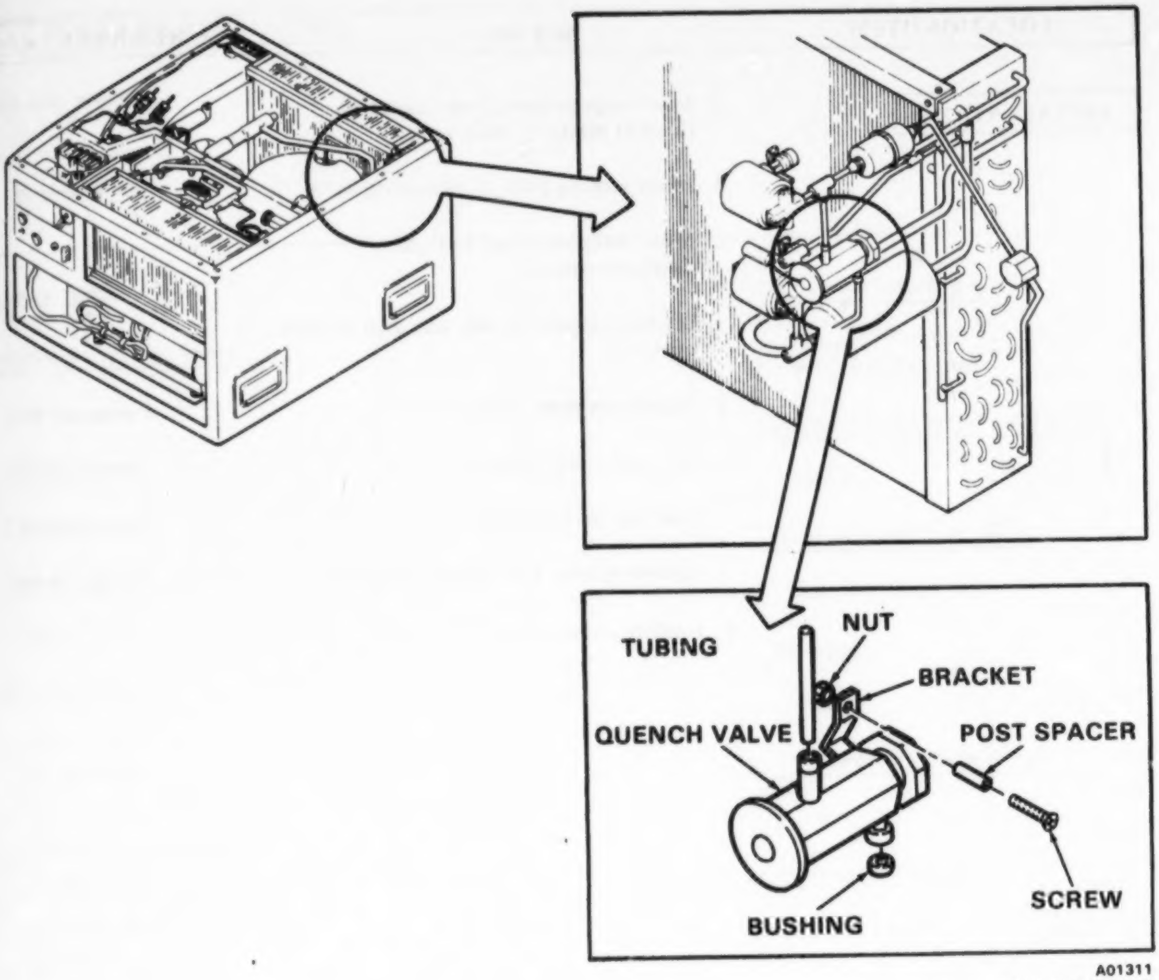
Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	NOTE The quench thermal expansion valve is hermetically sealed and cannot be repaired.	
	a. Discharge the refrigerant system.	Paragraph 6-4
	b. Remove housing rear top cover.	. . .
	c. Remove mastic in bulb well, remove bulb from well.	. . .
	d. Remove two screws, spacers, self-locking nuts, and valve mounting brackets.	. . .


TUBING
NUT
BRACKET
QUENCH VALVE
POST SPACER
SCREW
BUSHING

A01311
TM5-4120-367-14-59

Figure 6-27. Quench Valve

LOCATION/ITEM	ACTION	REMARKS
	NOTE Wrap valve with wet cloth to prevent overheating valve during soldering.	
	e. Unsolder tube at tee connection to pressure regulator.	. . .
	f. Unsolder tube at drier/filter tee.	. . .
INSTALLATION	a. Solder valve to tubing	Paragraph 6-3
	b. Install mounting bracket, two screws, spacers and self-locking nuts.	. . .

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	c. Insert approximately one ounce of thermal mastic in bulb well.	. . . .
	d. Insert sensing bulb of expansion valve.	. . . .
	e. Move bulb back and forth to distribute mastic.	. . . .
	f. Set bulb approximately one inch beyond open end.	. . . .
	g. Install new drier/filter.	Paragraph 6-15
	h. Nitrogen purge system.	Paragraph 6-5
	i. Leak test and evacuate.	Paragraphs 6-2 and 6
	j. Charge system with liquid refrigerant.	Paragraph 6-8
	k. Replace covers.	. . . .

6-27. PRESSURE REGULATORS

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

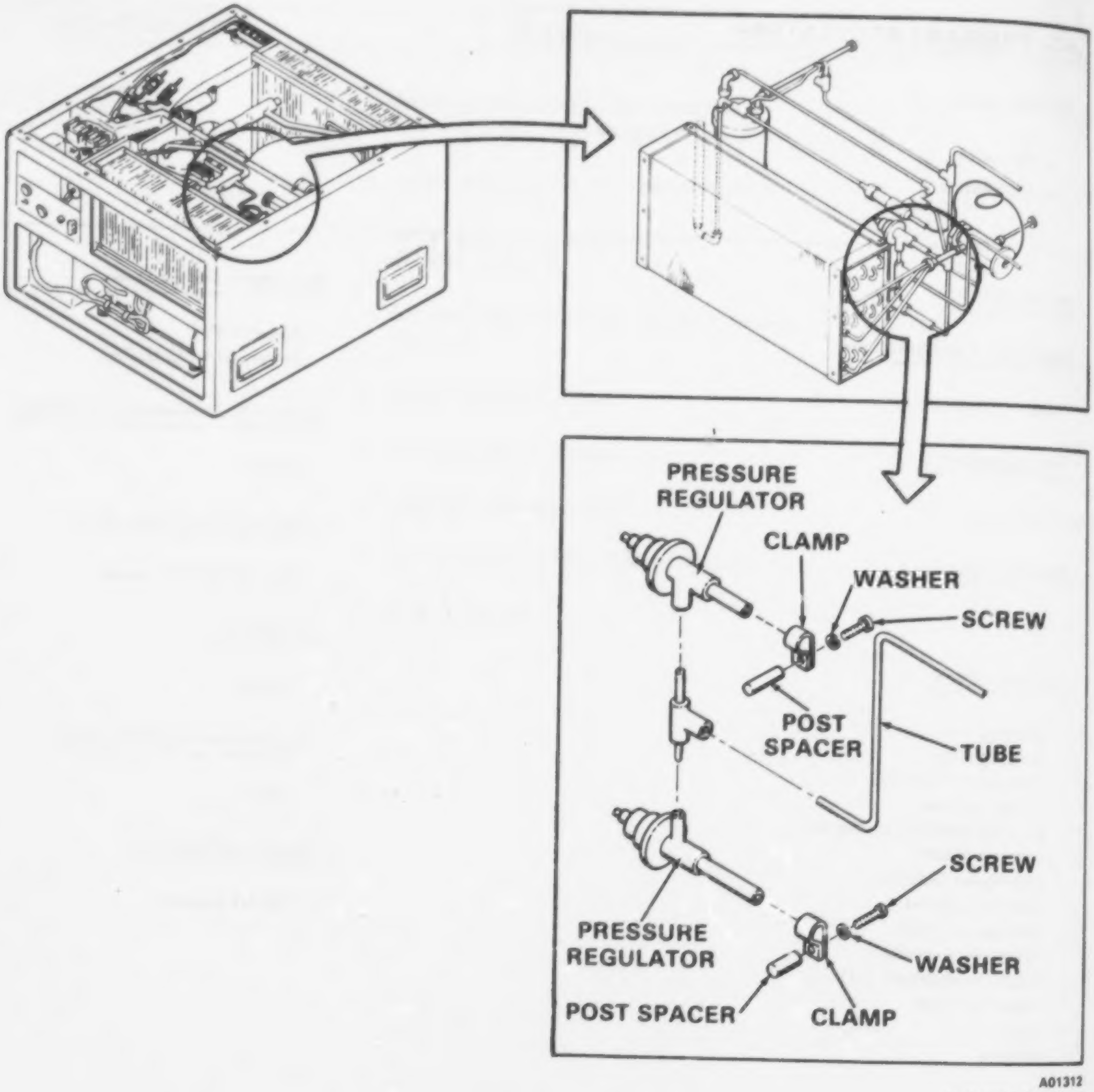
None

Troubleshooting References

None

Personnel Required

Direct support


PRESSURE REGULATOR
CLAMP
WASHER
SCREW
POST SPACER
TUBE
SCREW
PRESSURE REGULATOR
WASHER
POST SPACER
CLAMP

A01312
TM5-4120-367-14-60

Figure 6-28. Pressure Regulator

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Release refrigerant charge.	Paragraph 6-4
	b. Remove top covers.	. . . .
	c. Remove screws, lock washers, loop clamps, and spacers.	. . . .
	d. Unsolder pressure regulator from tubing.	Paragraph 6-3
INSTALLATION	a. Install new drier/filter	Paragraph 6-15
	NOTE Pressure regulator is factory set and is not field adjustable.	
	b. Wrap pressure regulator with wet cloth to prevent overheating regulator during soldering.	. . . .
	c. Solder pressure regulator to tubing.	. . . .
	d. Install spacer, loop clamp, screw, and lock washer.	. . . .
	e. Nitrogen purge system.	Paragraph 6-5
	f. Leak test and evacuate.	Paragraphs 6-2 and 6-6.
	g. Charge system with liquid refrigerant.	. . . .
	h. Replace covers.	. . . .

6-28. EVAPORATOR BLOWER AND MOTOR

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Safety glasses
Detergent Solution
Cleaning cloths
Tools (Paragraph 3-1)
Gloves

Equipment Descriptions

Power OFF
Installed or Removed from Shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

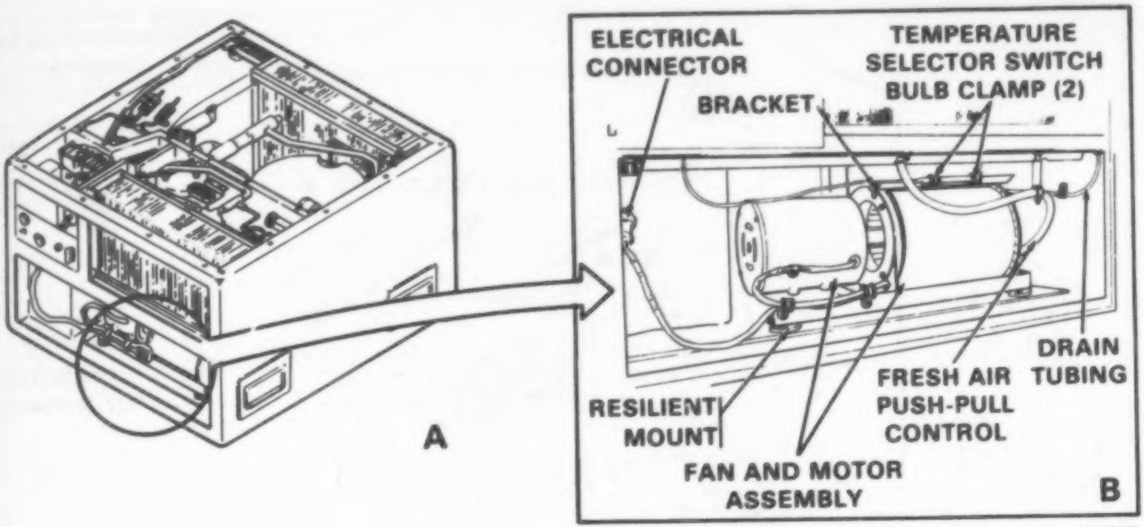
Troubleshooting References

None

Personnel Required

Direct support

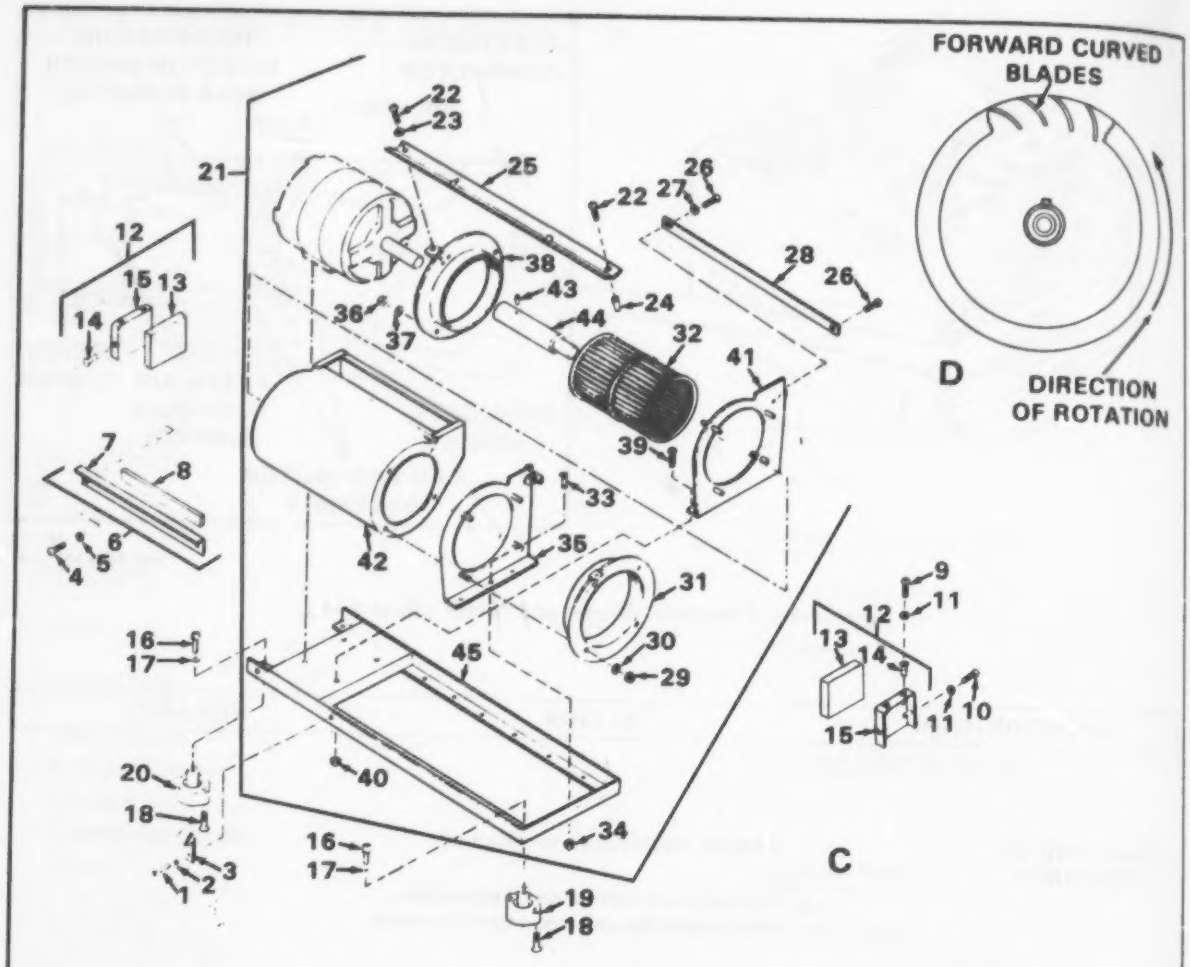
LOCATION/ITEM	ACTION	REMARKS
REMOVAL OF ASSEMBLY	a. Disconnect electric power to air conditioner.	**WARNING** High voltage can kill
	b. Remove air inlet louver and air filter.	Paragraph 5-19
	c. Disconnect condensate drain tubing.	Paragraph 5-23
	d. Remove three brackets (15 and 28) above fan to make it easier to remove fan and motor.	. . .
	e. Remove nuts (14) and screws (26).	. . .


A
ELECTRICAL CONNECTOR
TEMPERATURE SELECTOR SWITCH BULB CLAMP (2)
BRACKET
DRAIN TUBING
FRESH AIR PUSH-PULL CONTROL
RESILIENT MOUNT
FAN AND MOTOR ASSEMBLY
B

A01313
TM5-4120-367-14-61

Figure 6-29. Evaporator Blower and Motor (Sheet 1 of 2)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL OF ASSEMBLY	f. Remove temperatute sensing bulb.	Paragraph 5-11
	g. Remove four screws, and lockwashers which secure fan and motor base to mounts.	. . .
REMOVAL OF FAN	a. Remove fan strap.	. . .
	b. Remove motor and fan from base.	. . .
	c. Remove flange from housing.	. . .
	d. Remove the two fan inlets.	. . .
	e. Separate the motor and fan impeller from the housing.	. . .
	f. Loosen setscrew that holds shaft extension to motor shaft.	. . .
	g. Note position of arrow on impeller.	Needed for assembly
	h. Pull shaft extension and impeller off motor shaft.	. . .


FORWARD CURVED BLADES
D
DIRECTION OF ROTATION
C
21
22
23
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43
44
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15

1. SCREW
2. LOCKWASHER
3. CLAMP
4. SCREW
5. LOCKWASHER
6. BRACKET ASSEMBLY
7. BRACKET
8. FOAM
9. SCREW
10. SCREW
11. LOCKWASHER
12. BRACKET ASSEMBLY
13. FOAM
14. NUT
15. BRACKET
16. SCREW
17. LOCKWASHER
18. SCREW
19. RESILIENT MOUNT
20. RESILIENT MOUNT
21. FAN ASSEMBLY
22. SCREW
23. WASHER
24. SPACER
25. STRAP
26. SCREW
27. WASHER
28. STRAP
29. NUT
30. WASHER
31. FAN INLET
32. IMPELLER
33. SCREW
34. NUT
35. FLANGE
36. NUT
37. WASHER
38. INLET
39. SCREW
40. NUT
41. FLANGE
42. HOUSING
43. SET SCREW
44. SHAFT
45. BASE

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Figure 6-29. Evaporator Blower and Motor (Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL OF MOTOR	a. Removal of motor is same as removal of fan.	. . .
MOTOR REPAIR	a. See paragraph 6-29.	. . .
INSTALLATION	a. Place impeller on shaft extension.	. . .
	b. Tighten setscrew to secure.	. . .
	c. Place fan inlet onto face of motor.	. . .
	d. With arrow on impeller in same direction as motor rotation arrow, place shaft extension on motor shaft.	. . .
	e. Place fan inlet and flange in position against blower housing.	. . .
	f. Secure inlet and flange to housing.	. . .
	g. Slide housing over impeller.	. . .
	h. Secure fan inlet to housing.	. . .
	i. Secure fan strap to two fan inlets.	. . .
	j. Secure four mounts to base.	. . .
	k. Secure motor and housing to base.	. . .
	l. Secure assembly into air conditioner.	. . .
	m. Install three brackets.	. . .
	n. Install condensate drain.	Paragraph 5-23.
	o. Connect motor power connector.	. . .
	p. Install temperature sensing bulb.	Paragraph 5-11
	q. Clean air filter.	Paragraph 5-19.
	r. Install air filter and louver.	Paragraph 5-19.
	s. Connect power supply.	. . .

6-29. MOTOR.

This task covers:

a. Disassembly
b. Cleaning
c. Inspection
d. Assembly

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Safety glasses
Solvent PD680
Detergent solution
Cleaning cloths
Tools (Paragraph 3-1)
Abrasive cloth
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

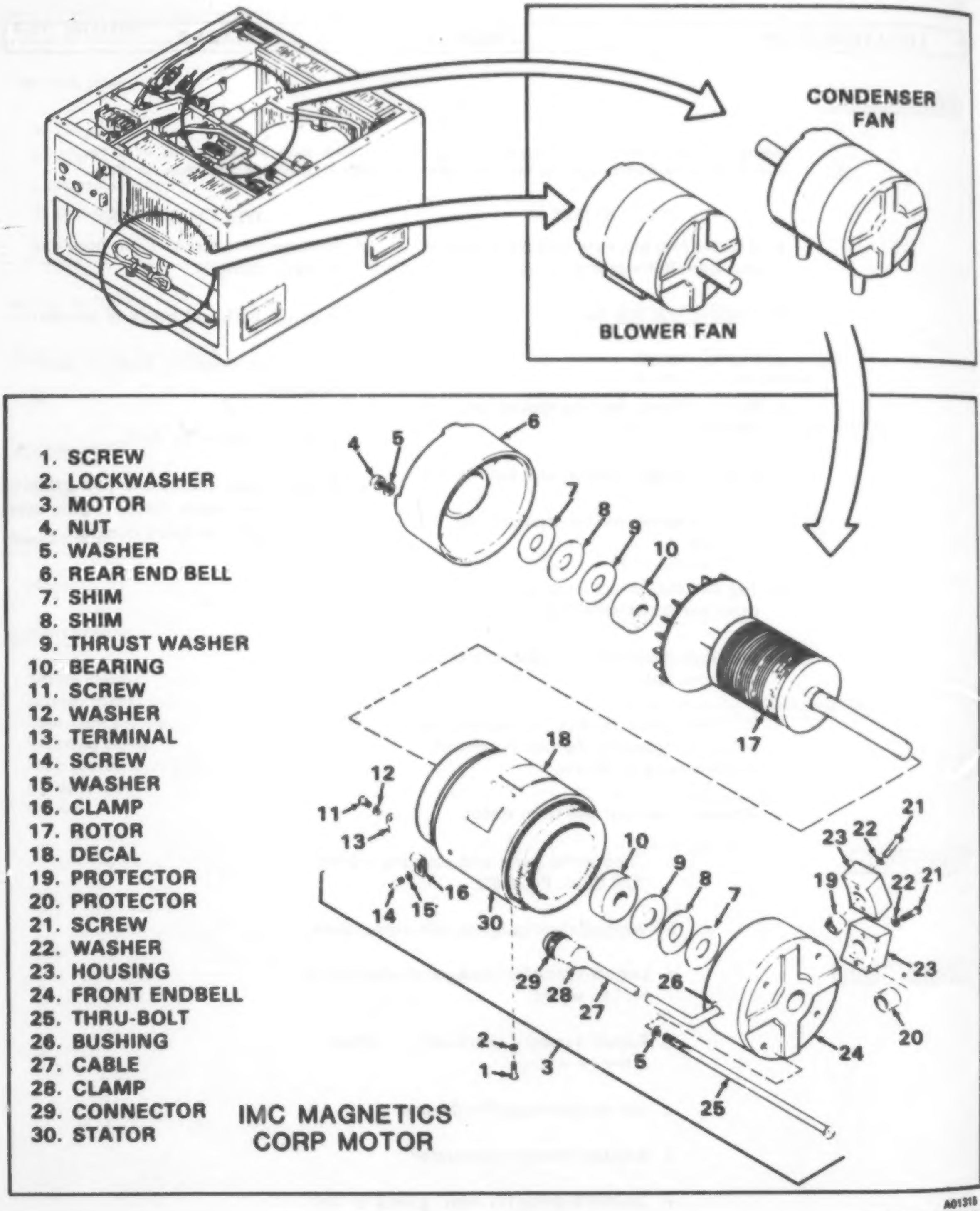
LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY		

NOTE

Motors manufactured by IM Magnetics Corp. do not come apart the same way as those manufactured by Welco Industries, Inc. See motor name plate to determine who made the motor.

IMC MOTOR	WELCO MOTOR
a. Remove four hex nuts, four through bolts, and eight flat washers.	a. Remove four screws from both end brackets (covers).
b. Remove rear end bell.	b. Remove both end brackets (covers).
c. Pull out rotor.	c. Remove load spring, washers, and bearings.
d. Remove shims, bearing spacers and bearings.	d. Remove rotor with shaft.
e. Remove screw, washer, and loop clamp.	e. Remove eight screws and pull protector covers from motor frame to gain access to high and low speed overload protectors.
f. Remove screw, washer, and ground terminal.	
g. Tag and disconnect leads and remove cable and strain relief bushing.	. . .
h. For single phase motors, remove front end bell from stator.	. . .
i. For three phase motors, remove thermal protector housings, thermal protectors and attaching hardware.	. . .
j. Remove front end bell from stator.	. . .

LOCATION/ITEM	ACTION	REMARKS
CLEANING	a. Clean metal parts with cleaning solvent (Fed Spec. P-D-680).	. . .
	b. Wipe off electrical parts with a clean cloth.	. . .
INSPECTION	a. Inspect wiring for damaged insulation and broken wiring.	. . .
	b. Repair damaged insulation or replace defective wiring.	. . .
	c. Inspect connector for damage.	. . .
	d. Replace damaged connector.	. . .
	e. Inspect bearing for wear, galling or flat spots.	. . .
	f. Replace defective bearings.	. . .


CONDENSER FAN
BLOWER FAN
1. SCREW
2. LOCKWASHER
3. MOTOR
4. NUT
5. WASHER
6. REAR END BELL
7. SHIM
8. SHIM
9. THRUST WASHER
10. BEARING
11. SCREW
12. WASHER
13. TERMINAL
14. SCREW
15. WASHER
16. CLAMP
17. ROTOR
18. DECAL
19. PROTECTOR
20. PROTECTOR
21. SCREW
22. WASHER
23. HOUSING
24. FRONT ENDBELL
25. THRU-BOLT
26. BUSHING
27. CABLE
28. CLAMP
29. CONNECTOR
30. STATOR
IMC MAGNETICS CORP MOTOR
1
2
3
4
5
6
7
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12
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Figure 6-30. IMC Motor

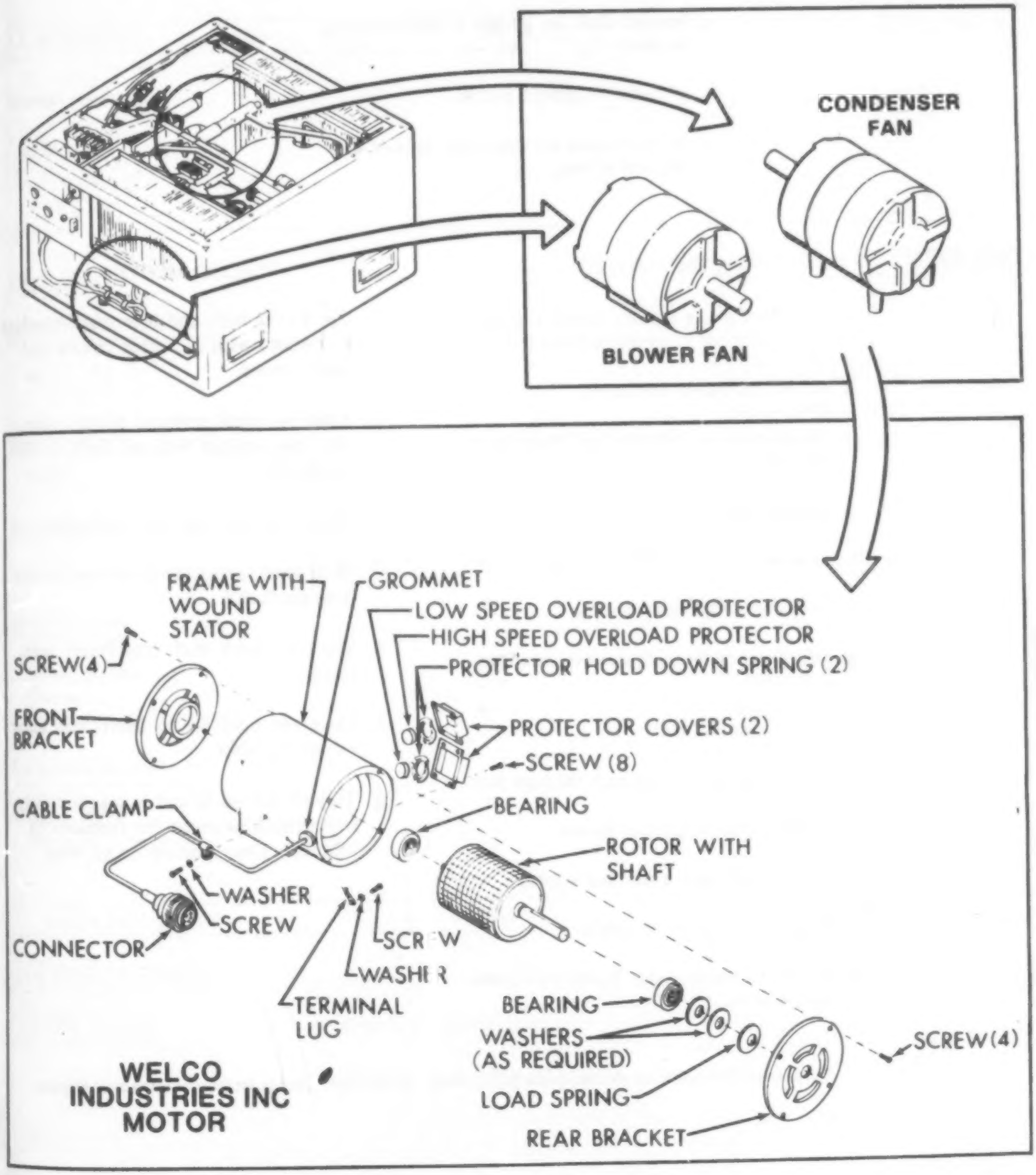
CONDENSER FAN
BLOWER FAN
FRAME WITH WOUND STATOR
GROMMET
LOW SPEED OVERLOAD PROTECTOR
HIGH SPEED OVERLOAD PROTECTOR
PROTECTOR HOLD DOWN SPRING (2)
SCREW(4)
FRONT BRACKET
PROTECTOR COVERS (2)
SCREW (8)
CABLE CLAMP
BEARING
ROTOR WITH SHAFT
WASHER
SCREW
CONNECTOR
SCREW
WASHER
TERMINAL LUG
BEARING
WASHERS (AS REQUIRED)
SCREW(4)
LOAD SPRING
REAR BRACKET
WELCO INDUSTRIES INC MOTOR

Figure 6-31. Welco Motor

LOCATION/ITEM	ACTION	
	g. Inspect shaft for gouges or worn bearing surface.	. . .
	h. If defective replace motor.	
	i. Inspect stator for damaged, broken or shorted wiring.	. . .
ASSEMBLY	IMC MOTOR	WELCO MOTOR
	a. For three phase motors, install thermal protectors and housings in front end bell.	a. Secure the high and low speed overload protectors with protector covers and eight screws.
	b. Install connector and cable.	b. Coat the shaft surfaces of the rotor and load springs with oil (MIL-L-2104, Grade 20).
	c. Install cable and strain relief bushing in endbell.	c. Slide both bearings on shaft ends.
	d. Partially install end bell on stator.	d. Slide load springs and washers on the long shaft end.
	e. Connect terminal with screw and washer.	e. Slip rotor with shaft into frame with stator.
	f. Make electrical connections.	f. Place end brackets on shafts and aline mounting holes.
	g. Install shims, bearing spacers, bearings and rotor.	g. Tighten screws in end brackets evenly while checking rotor for freedom of rotation. There should be no drag.
	h. Install rear end bell.	
	i. Place a flat washer on each through bolt	
	j. Install through bolts in motor.	
	k. Secure each with a nut and washer.	. . .
	l. Install loop clamp on cable.	. . .
	m. Secure clamp to stator frame with screw and washer.	. . .

For further information on electric motor repair, refer to FM 20-31 (Electric Motor and Generator Repair).

CHAPTER 7
PREPARATION FOR STORAGE OR SHIPMENT

7-1. STORAGE.

This task covers:

a. Storage

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Safety glasses
Gloves
Heavy duty cover material

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
AIR CONDITIONER		
SHORT TERM	a. Unroll the fabric cover.	. . .
	b. Snap cover in place.	. . .

LOCATION/ITEM	ACTION	REMARKS
LONG TERM	a. Unroll the fabric cover.	. . .
	b. Snap cover in place.	. . .
	c. Place air conditioner in a dry, covered, area.	. . .
	d. Cover air conditioner so that it will be protected from damage by high winds, water, snow, or dust and dirt.	. . .

7-2. SHIPMENT.

This task covers:

a. Shipment

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Packing materials
Wood for base
Kraft paper, plastic wrap, tape
Strapping material

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

Standard Army Procedures

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
SHIPMENT	a. Bolt air conditioner to a heavy wood frame.	2 x 4 or 4 x 4
	b. Cover with plastic wrap, kraft paper etc.	. . .
	c. Strap covering in place.	. . .
	d. Mark air conditioner per standard Army Procedures.	. . .

APPENDIX A

REFERENCES

1. Fire Protection and Safety	
TB 5-4200-200-10	Hand Portable Fire Extinguisher for Army Users.
2. Lubrication	
C91001L	Fuels, Lubricants, Oils and Waxes.
3. Painting	
TM 43-0139	Painting Instructions for Field Use.
4. Maintenance	
TM 5-4120-367-24P	Organizational, Direct Support, and General Support Repair Parts and Special Tools List for Air Conditioner, Horizontal Compact, 18,000 BTU/HR
TM 5-4120-367-14 HR	Hand Receipt Manual
TM 38-750	The Army Maintenance Management System (TAMMS)
Fed. Spec. P-D-680	Dry Cleaning Solvent
-5. Shipment and Storage	
TM 740-90-1	Administration Storage of Equipment
-6. Demolition	
TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use

APPENDIX B

COMPONENTS OF END ITEMS LIST (COEIL)

Section I. INTRODUCTION

1. SCOPE

This appendix lists Integral Components of and Basic ue Items (BII) for the Air Conditioner to help you entory items required for safe and efficient operation.

2. GENERAL

The components of end item list are divided into the owing sections:

Section II. Integral Components of the End Item. se items, when assembled, comprise the Air nditioner and must accompany it whenever it is nsferred or turned in. These illustrations will help you ntify these items.

Section III. Basic Issue Items. These are minimum ential items required to place the Air Conditioner in ration, to operate it and to perform emergency airs. Although shipped separately packed, they must ompany the Air Conditioner during operation and enever it is transferred between accountable officers. e illustrations will assist you with hard-to-identify ms. This manual is your authority to requisition lacement BII based on Table(s) of Organization and uipment (TOE)/Modification Table of Organization d Equipment (MTOE) authorization of the end item.

3. EXPLANATION OF COLUMNS

Illustration: This column is divided as follows:

(1) Figure Number. Indicates the figure number of e illustration on which the item is shown (if applicable).

(2) Item Number. The number used to identify item called out in the illustration.

b. National Stock Number (NSN): Indicates the national stock number assigned to the end item which will be used for requisitioning.

c. Part Number (PN): Indicates the primary number used by the manufacturer which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards and inspection requirements to identify and item or range of items.

d. Description: Indicates the federal item name and, if required, a minimum description to identify the item.

e. Location: The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

f. Usable on Code: "USABLE ON" codes are included to help you identify which component items are used on the different models. Identification of the codes used in this list are:

CODE	USED ON

g. Quantity Required (Qty Reqd): This column lists the quantity of each item required for a complete major item.

h. Quantity: This column is left blank for use during inventory. Under the received column, list the quantity you actually receive on your major item. The date columns are for use when you inventory the major item at a later date, such as for shipment to another site.

Section II. INTEGRAL COMPONENTS OF END ITEM

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8) Quantity			
(a) Figure No.	(b) Item No.	National Stock Number	Part No. & FSCM	Description	Location	Usable On Code	Qty Reqd	Rcv'd	Date	Date	Date
		5340-01-042-5759	13216E6137 (97403)	Mount, Resilient			8				
		4720-01-038-2334	13216E6153 (97403)	Tube, Elastomeric			4				
		5310-00-566-9504	13216E6138-2 (97403)	Washer			4				
		5305-00-269-2807	MS90726-64	Screw, Cap, Hex HD			4				

Section III. BASIC ISSUE ITEMS

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8) Quantity			
(a) Figure No.	(b) Item No.	National Stock Number	Part No. & FSCM	Description	Location	Usable On Code	Qty Reqd	Rcv'd	Date	Date	Date
		5220-00-559-9618		Case, Manual			1				
				Department of Army Technical Manual; Operator, Organizational, and Direct and General Support Maintenance Manual. TM 5-4120-367-14							
				Department of Army Technical Manual; Organizational, Direct Support and General Support Repair Parts and Special Tools List for Air Conditioner, Horizontal Compact, 18,000 BTU/HR.							

APPENDIX C

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1. SCOPE.

This appendix lists expendable supplies and materials you will need to operate and maintain the Air Conditioner. These items are authorized to you by CTA50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. EXPLANATION OF COLUMNS.

a. Column 1—Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g. "Use Coater, Air Filter, Item 1, Appendix C").

b. Column 2—Level. This column identifies the lowest level of maintenance that requires the listed item. (enter as applicable):

C—Operator/Crew
O—Organizational Maintenance
F—Direct Support Maintenance
H—General Support Maintenance

c. Column 3—National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column 4—Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parenthesis, if applicable.

e. Column 5—Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	0	4130-00-860-0042	Coater, Air Filter, 1 Pint Containe.	EA
2	0	3040-00-664-0439	Adhesive, General Purpose, 1 Pint Container	EA

APPENDIX D

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

GENERAL.

This section provides a general explanation of all enance and repair functions authorized at various enance levels.

The Maintenance Allocation Chart (MAC) in on II designates overall responsiblity for the rmance of maintenance functions on the identified item or component. The implementation of the enance functions upon the end item or component be consistent with the assigned maintenance ions.

Section III lists the special tools and test equipment red for each maintenance function as referenced Section II.

Section IV contains supplemental instructions on natory notes for a particular maintenance function.

MAINTENANCE FUNCTIONS.

Inspect. To determine the serviceability of an item mparing its physical, mechanical and/or electrical cteristics with established standards through ination.

Test. To verify serviceability and detect incipient e by measuring the mechanical or electrical cteristics of an item and comparing those cteristics with prescribed standards.

Service. Operations required periodically to keep an in proper operating condition, i.e., to clean ntaminate), to preserve, to drain, to paint, or to nish fuel, lubricants, hydraulic fluids, or compressed pplies.

Adjust. To maintain, within prescribed limits, by ing into proper or exact position, or by setting the ating characteristics to specified parameters.

Aline. To adjust specified variable elements of an to bring about optimum or desired performance.

Calibrate. To determine and cause corrections to be or to be adjusted on instruments or test measuring diagnostic equipments used in precision surement. Consists of comparisons of two uments, one of which is a certified standard of known racy, to detect and adjust any discrepancy in the racy of the instrument being compared.

Install. The act of emplacing, seating, or fixing into ion an item, part, or module (component or bly) in a manner to allow the proper functioning of uipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, aline, calibrate, or replace) maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), and item or system.

j. Overhaul. That maintenance effort (services/actions) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

D-3. COLUMN ENTRIES USED IN THE MAC.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform the maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The number of man-hours specified by the work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition. The symbol designations for the various maintenance levels are as follows:

C	Operator or crew
O	Organization maintenance
F	Direct support maintenance
H	General support maintenance
D	Depot maintenance

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall contain a letter code in alphabetical order which shall be keyed to the remarks contained in Section IV.

D-4. COLUMN ENTRIES USED IN TOOL AND TEST EQUIPMENT REQUIREMENTS

a. Column 1, Tool or Test Equipment Reference Code. The tool and test equipment reference code correlates with a maintenance function on the identified end item or component.

b. Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National/NATO Stock Number. The National or NATO stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

D-5. EXPLANATION OF COLUMNS IN SECTION IV.

a. Reference Code. The code scheme recorded in column 6, Section II.

b. Remarks. This column lists information pertinent to the maintenance function being performed as indicated on the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
01	FINAL ASSEMBLY								
	Connectors	Inspect		0.5					
		Replace		2.0					
	Capacitors	Inspect		0.5					
		Test		0.5					
		Replace		2.0					
	Information Plates	Inspect	.05						
		Service	.05						
		Replace		1.0					
	Installation Hardware	Inspect		0.5					
		Replace		0.5					
02	HOUSING COVERS, PANELS, GRILLES, SCREENS, AND INFORMATION PLATES								
	Covers	Inspect	.05						
		Service		0.5					
		Repair			1.0	(Replace Gasket and Insulation)			
		Replace			1.0				

MAINTENANCE ALLOCATION CHART (CONTINUED)

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
	Panels	Inspect	0.5						
		Service		0.5					
		Repair			2.0				(Replace Gasket and Insulation)
		Replace			1.0				
	Grilles (Louvers)	Inspect	0.5						(Include operating Instructions)
		Adjust	0.2						
		Service	0.5						
		Replace			1.0				
	Screens and Guards	Inspect	0.5						
		Service	0.5						
		Replace			0.5				
	Information Plates	Inspect	0.2						
		Service	0.2						
		Replace			0.5				
03	AIR CIRCULATING AND CONDENSATE DRAIN SYSTEM								
	Air filters	Inspect	0.5						
		Service		0.5					
		Replace		1.0					
	Mist Eliminator	Inspect		0.5					
		Service		0.5					
		Replace		1.0					
	Condenser Discharge Louver linkage	Inspect		0.5					
		Service		1.0					
		Adjust		1.0					
		Replace		2.0					
	Fresh Air Damper and Actuator	Inspect		0.5					
		Service		0.5					
		Adjust	0.5						
		Replace		2.0					
	Condensate Traps and Drain Tubes	Inspect	0.5						
		Service		0.5					
		Replace		1.0					

MAINTENANCE ALLOCATION CHART (CONTINUED)

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	04 Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
04	ELECTRICAL								
	Control Module	Inspect	0.5						
		Adjust	0.5						
		Test		2.0					
		Repair		2.0					
		Replace		2.0					
	Junction Box	Inspect		0.5					
		Service		0.5					
		Test		2.0					
		Repair		2.0					
		Replace		2.0					
	Wiring Harness	Inspect		0.5					
		Test		0.5					
		Repair		2.0					
		Replace		4.0					
	Transformer	Test		0.5					
		Replace		1.0					
	Rectifier	Test		0.5					
		Replace		1.0					
	Condenser Fan Thermostat and Cable Assembly	Inspect		0.5					
		Test		1.0					
		Replace		1.0					
05	EVAPORATOR FAN, MOTOR AND HEATER								
	Fan and Housing	Inspect		0.5					
		Service		1.0					
		Replace			2.0				
	Motor	Inspect		0.5					
		Service		0.5					
		Test		0.5					
		Repair			2.0			(Replace Bearings and Elec. Connector only)	
		Replace			3.0				
	Heater Thermostat	Inspect		0.5					
		Test		0.5					
		Replace		0.5					
	Heater Element	Inspect		0.5					
		Test		0.5					
		Replace		2.0					

MAINTENANCE ALLOCATION CHART (CONTINUED)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance level					(5) Tools and eqiupment	(6) Remarks
			C	O	F	H	D		
06	CONDENSER FAN, MOTOR AND LOUVER ACTUATING CYLINDER								
	Fan and Housing	Inspect		0.5					
		Service		0.5					
		Replace			1.0				
	Motor	Inspect		0.5					
		Test		0.5					
		Repair			2.0				(Replace Bearings and Elec. Connector only)
		Replace			3.0				
	Actuating Cylinder	Inspect		0.5					
		Adjust			1.0				
		Replace			1.0				
07	REFRIGERATION SYSTEM								
	Evaporator Coil	Inspect		0.5					
		Service		0.5					
		Replace			8.0				
	Expansion Valves	Test			0.5				
		Adjust			1.0				
		Replace			2.0				
	Pressure Switches	Test			0.5				
		Replace			1.0				
	Condenser Coil	Inspect		0.5					
		Service		0.5					
		Repair			8.0				
	Solenoid Valves	Test			0.5				(Coil only)
		Repair		1.0					(Replace Coil only)
		Replace			1.5				
	Liquid Indicator	Inspect	0.5						
		Service	0.5						
		Replace			4.0				
	Dehydrator	Inspect			0.5				
		Replace			1.5				
	Compressor	Test			0.5				
		Repair			0.5				(External Component) only)
		Replace			12.0				
	Tubing & Fittings	Test			0.5				
		Replace			1.5				

MAINTENANCE ALLOCATION CHART (CONTINUED)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance level					(5) Tools and eqiupment	(6) Remarks
			C	O	F	H	D		
08	HOUSING								
	Housing								
		Inspect					0.5		(Replace Insulation & Lifting Hand)
		Service					0.5		
		Replace					2.0		

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance level	(3) Nomenclature	(4) National/NATO stock number	(5) Tool number
		No special tools and test equipment required. Standard tools and test equipment in the following kits are adequate to accomplish the maintenance functions listed in Section II:		
		Tool Kit, service, refrigeration Unit (SC 5180-90-CL-N18)	5180-00-596-1474	
		Soldering Gun Kit	3439-00-930-1638	

Section IV. REMARKS MAINTENANCE ALLOCATION CHART

Reference Code	Remarks
	No supplemental instructions or explanatory remarks are required for the maintenance functions listed in Section II. All functions are sufficiently defined in Section I. Active time listed for maintenance task functions are with the air conditioner in off-equipment position.

APPENDIX E

TORQUE LIMITS

This appendix lists standard torque values and provides general information and methods for applying torque. Special torque values and sequences are indicated in the maintenance procedures for applicable components.

Thread Size	Minimum Breakaway Torque (In.-Lbs.)	Thread Size	Minimum Breakaway Torque (In.-Lb 1)
10-32	2.0	5/8-18	32.0
1/4-28	3.5	3/4-16	50.0
5/16-24	6.5	7/8-14	70.0
3/8-24	9.5	1-12	90.0
7/16-20	14.0	1-1/8-12	117.0
1/2-20	18.0	1-1/4-12	143.0
9/16-18	24.0		

NOTE

To determine breakaway torque, thread nut onto screw or bolt until at least two threads stick out. Nut shall not make contact with a mating part. Stop the nut. Torque necessary to begin turning nut again is the breakaway torque. Do not reuse selflocking nuts that do not meet minimum breakaway torque.

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Charts Transposed to

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DATE
24 Nov 80

TITLE Air Conditioner, Horizontal, Compact, 18,000 BTU/HR Cooling

BE EXACT. . .PIN-POINT WHERE IT IS: PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In the key to fig. 4-3, item 16 is called a shim. Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered so the NSN is wrong. Please give me a good NSN.

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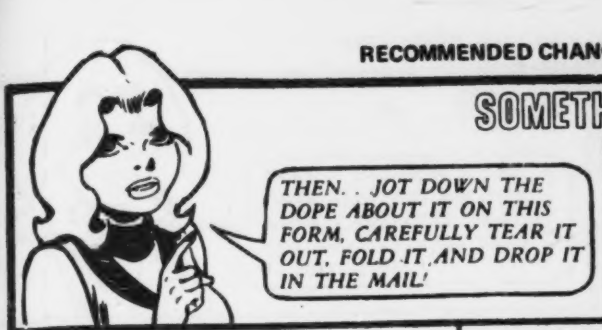
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The Metric System and Equivalents

Linear Measure

centimeter = 10 millimeters = .39 inch
decimeter = 10 centimeters = 3.94 inches
meter = 10 decimeters = 39.37 inches
dekameter = 10 meters = 32.8 feet
hectometer = 10 dekameters = 328.08 feet
kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

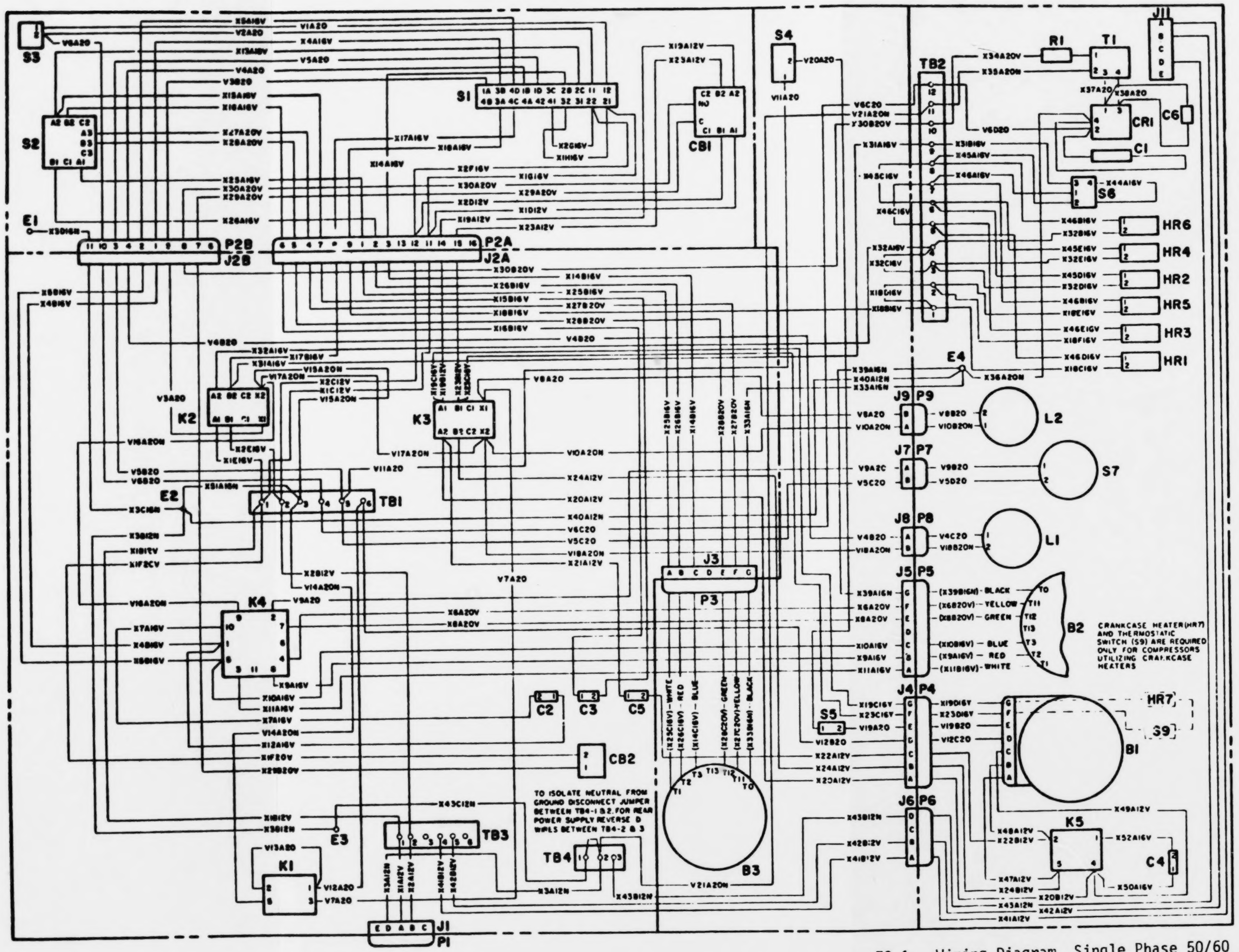
1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.365	metric tons	short tons	1.102
pound-inches	mewton-meters	.11375			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C



TO ISOLATE NEUTRAL FROM GROUND DISCONNECT JUMPER BETWEEN TB4-1 & 2. FOR REAR POWER SUPPLY REVERSE D WIRES BETWEEN TB4-2 & 3

CRANKCASE HEATER (HR7) AND THERMOSTATIC SWITCH (S9) ARE REQUIRED ONLY FOR COMPRESSORS UTILIZING CRANKCASE HEATERS

F0-1. Wiring Diagram, Single Phase 50/60 Hertz, 230 Volts

NOTE: Where Sheet 2 is referenced see FO-2.

COMPONENT REFERENCE LIST

ELEC REF DESIG	DESCRIPTION
B1	COMPRESSOR, ROTARY
B2	MOTOR, CONDENSER FAN
B3	MOTOR, EVAPORATOR FAN
C1	CAPACITOR, FILTER
C2	CAPACITOR, CONDENSER RUN
C3	CAPACITOR, EVAPORATOR RUN
C4	CAPACITOR, COMPRESSOR START
C5	CAPACITOR, COMPRESSOR RUN
C6	CAPACITOR
CB1	CIRCUIT BREAKER, COMPRESSOR
CB2	CIRCUIT BREAKER, CONTROL
CR1	RECTIFIER; SEMICONDUCTOR DEVICE
E1	TERMINAL STUD, (CONTROL MODULE GRD)
E2	TERMINAL STUD, (JUNCTION BOX GRD)
E3 AND E4	TERMINAL STUD, (SYSTEM GRD)
HR1 THRU 6	HEATER ELEMENT
J1 AND J 11	CONNECTOR, RECEPTACLE, POWER INPUT
J2	CONNECTOR, RECEPTACLE, JUNCTION BOX
J3	CONNECTOR, RECEPTACLE, EVAPORATOR FAN
J4	CONNECTOR, RECEPTACLE, COMPRESSOR
J5	CONNECTOR, RECEPTACLE, CONDENSER FAN
J6	CONNECTOR, RECEPTACLE, POWER INPUT
J7	CONNECTOR, RECEPTACLE, THERMOSTATIC SWITCH
J8	CONNECTOR, RECEPTACLE, SOLENOID VALVE BY-PASS
J9	CONNECTOR, RECEPTACLE, SOLENOID VALVE EQUALIZER
J10	CONNECTOR, RECEPTACLE, COMPRESSOR
K1	RELAY, TIME DELAY
K2	RELAY HEATER
K3	RELAY, COMPRESSOR MOTOR
K4	RELAY, CONDENSER FAN
K5	RELAY, COMPRESSOR START
L1	VALVE, SOLENOID, BY-PASS
L2	VALVE, SOLENOID, PRESSURE EQUALIZER
P1	CONNECTOR, PLUG, POWER INPUT
P2	CONNECTOR, PLUG, CONTROL MODULE
P3	CONNECTOR, PLUG, EVAPORATOR FAN
P4	CONNECTOR, PLUG, COMPRESSOR
P5	CONNECTOR, PLUG, CONDENSER FAN
P6	CONNECTOR, PLUG, POWER INPUT
P7	CONNECTOR, PLUG, THERMOSTATIC SWITCH
P8	CONNECTOR, PLUG, SOLENOID VALVE BY-PASS
P9	CONN, PL, SOL VALVE EQUALIZER
P10	CONNECTOR, PLUG, COMPRESSOR
R1	RESISTOR
S1	SWITCH, ROTARY SELECTOR
S2	SWITCH, TOGGLE
S3	SWITCH, TEMPERATURE CONTROL
S4	SWITCH, HIGH PRESSURE CUTOUT
S5	SWITCH, LOW PRESSURE CUTOUT
S6	SWITCH, HEATER CUTOUT
S7	SWITCH, THERMOSTATIC
T1	TRANSFORMER
TB1	TERMINAL BOARD, JUNCTION BOX
TB2	TERMINAL BOARD
TB3	TERMINAL BOARD, POWER INPUT
TB4	TERMINAL BLOCK

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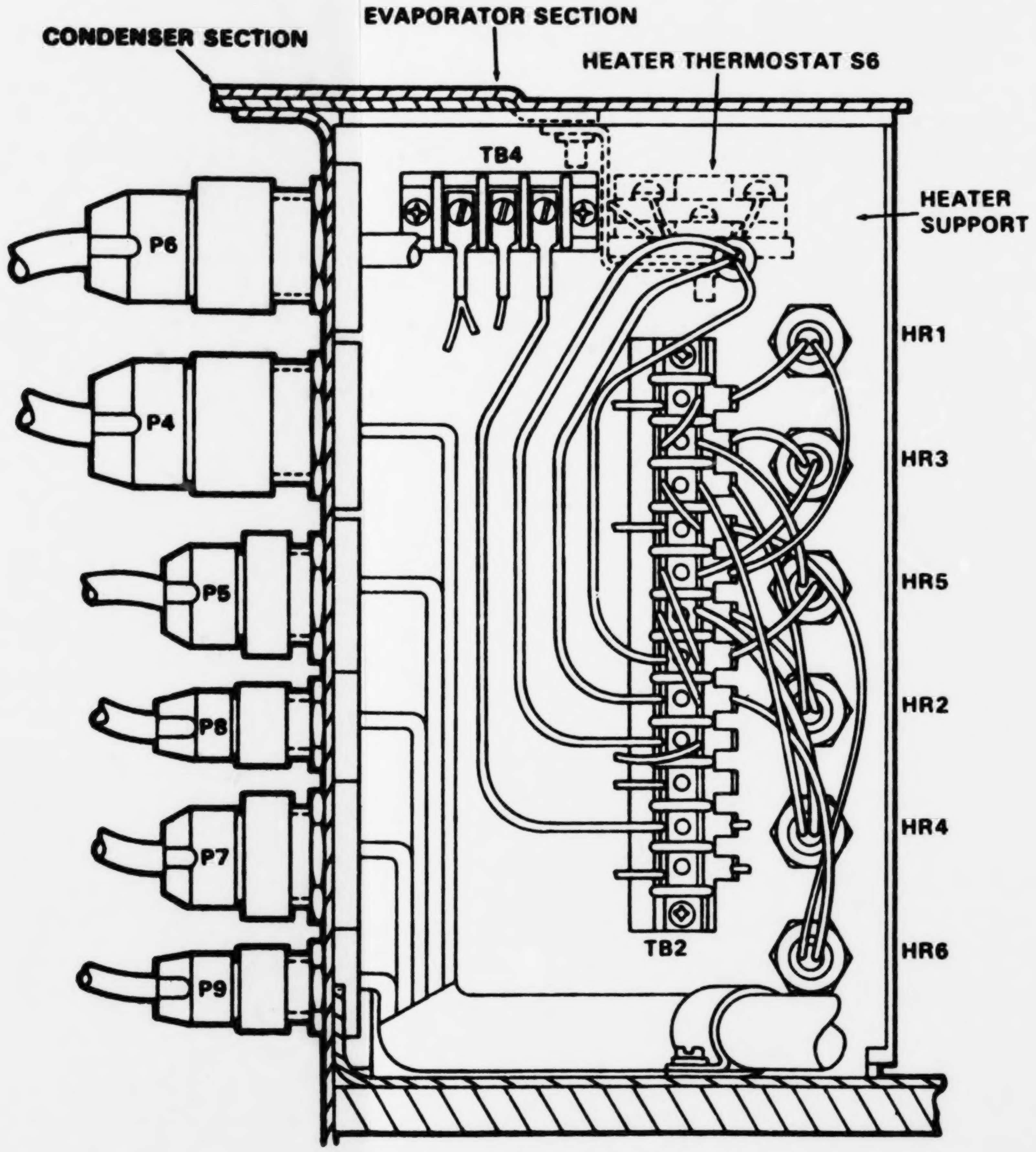
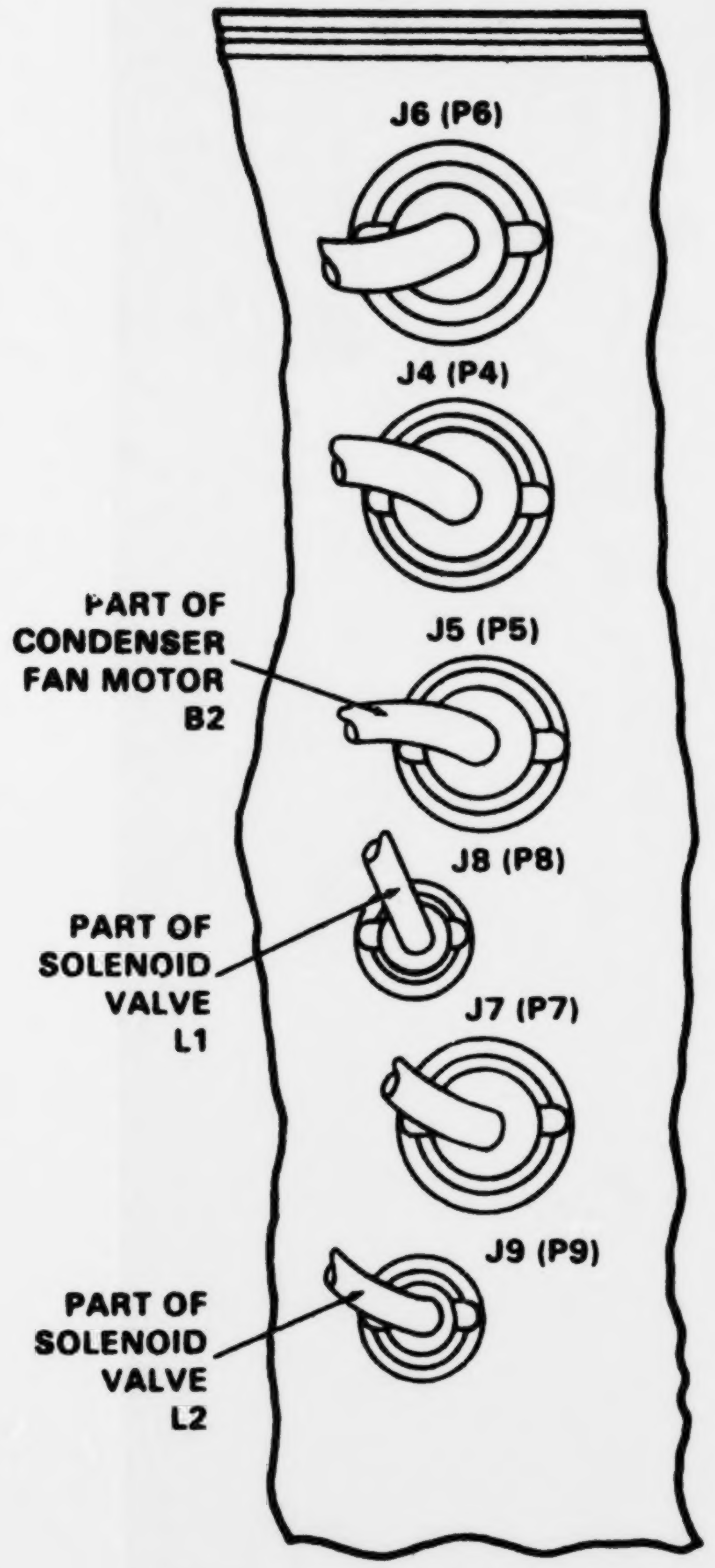
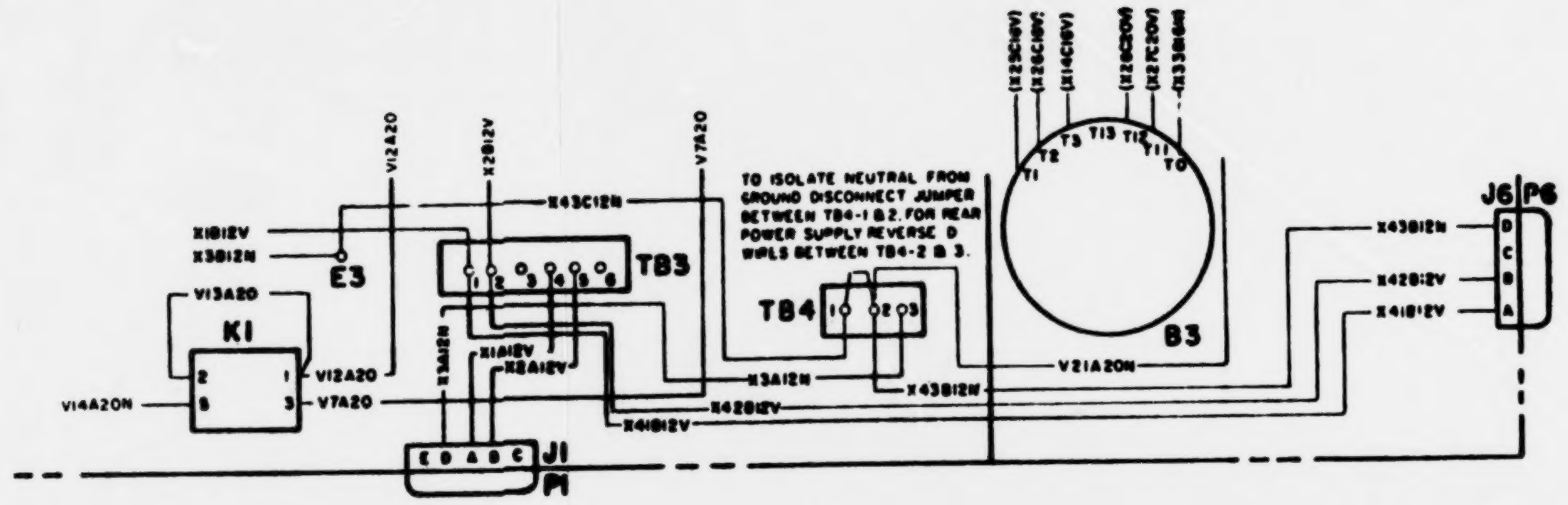
NOTE: Where Sheet 1 is referenced see FO-1.


CONDENSER SECTION
EVAPORATOR SECTION
HEATER THERMOSTAT S6
TB4
HEATER SUPPORT
P6
P4
P5
P8
P7
P9
HR1
HR3
HR5
HR2
HR4
HR6
TB2


J6 (P6)
J4 (P4)
PART OF CONDENSER FAN MOTOR B2
J5 (P5)
J8 (P8)
PART OF SOLENOID VALVE L1
J7 (P7)
J9 (P9)
PART OF SOLENOID VALVE L2


X1B12V
X3B12N
E3
V13A20
K1
V14A20N
V12A20
V7A20
X2B12V
X43C12N
TB3
X3A12N
X1A12V
X2A12V
J1
P1
X42B12V
X41B12V
X43B12N
TB4
(X25C16V)
(X26C16V)
(X14C16V)
(X28C20V)
(X27C20V)
(X33B16N)
T1
T2
T3
T13
T12
T11
T0
B3
V21A20N
J6
P6
D
C
B
A

TO ISOLATE NEUTRAL FROM GROUND DISCONNECT JUMPER BETWEEN TB4-1 & 2. FOR REAR POWER SUPPLY REVERSE D WIRES BETWEEN TB4-2 & 3.

FO-2. Wiring Diagram, Single Phase 50/60 Hertz, 230 Volts

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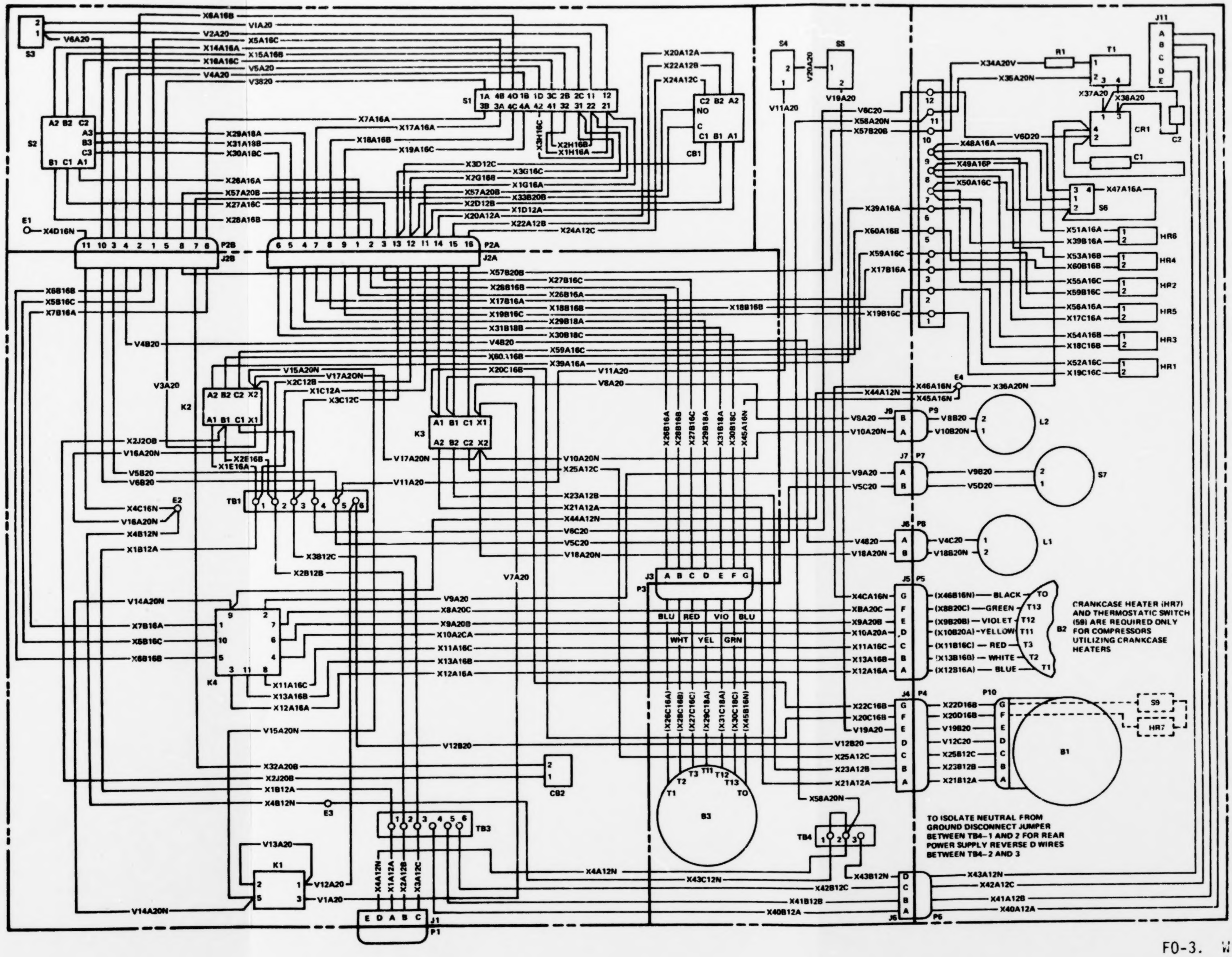
NOTE: Where Sheet 2 is referenced
see FO-4.


S1
S2
S3
S4
S5
S6
K1
K2
K3
K4
CB1
CB2
CR1
T1
R1
C1
C2
J11
E1
E2
E3
E4
TB1
TB3
TB4
J1
P1
J2B
J2A
P2B
P2A
J3
P3
J4
P4
J5
P5
J6
P6
J7
P7
J8
P8
J9
P9
P10
B1
B2
B3
L1
L2
S7
HR1
HR2
HR3
HR4
HR5
HR6
HR7
S9
BLU
RED
VIO
WHT
YEL
GRN
CRANKCASE HEATER (HR7) AND THERMOSTATIC SWITCH (S9) ARE REQUIRED ONLY FOR COMPRESSORS UTILIZING CRANKCASE HEATERS
TO ISOLATE NEUTRAL FROM GROUND DISCONNECT JUMPER BETWEEN TB4–1 AND 2 FOR REAR POWER SUPPLY REVERSE D WIRES BETWEEN TB4–2 AND 3

COMPONENT REFERENCE LIST

ELEC REF DESIG	DESCRIPTION
B1	COMPRESSOR, ROTARY
B2	MOTOR, CONDENSER FAN
B3	MOTOR, EVAPORATOR FAN
C1	CAPACITOR, FILTER (EMI)
C2	CAPACITOR (EMI)
CB1	CIRCUIT BREAKER, COMPRESSOR
CB2	CIRCUIT BREAKER, CONTROL
CR1	RECTIFIER, SEMICONDUCTOR DEVICE
E1	TERMINAL STUD (CONTROL MODULE GRD)
E2	TERMINAL STUD (JUNCTION BOX GRD)
E3 AND E4	TERMINAL STUD (SYSTEM GRD)
HR1 THRU 6	HEATER ELEMENT
J1 AND 11	CONNECTOR, RECEPTACLE, POWER INPUT
J2	CONNECTOR, RECEPTACLE, JUNCTION BOX
J3	CONNECTOR, RECEPTACLE, EVAPORATOR FAN
J4	CONNECTOR, RECEPTACLE COMPRESSOR
J5	CONNECTOR, RECEPTACLE CONDENSER FAN
J6	CONNECTOR, RECEPTACLE, POWER INPUT
J7	CONNECTOR, RECEPTACLE THERMOSTATIC SWITCH
J8	CONNECTOR, RECEPTACLE, SOLENOID VALVE BY PASS
J9	CONNECTOR, RECEPTACLE, SOLENOID VALVE EQUALIZER
J10	CONNECTOR, RECEPTACLE COMPRESSOR
K1	RELAY, TIME DELAY
K2	RELAY, HEATER
K3	RELAY, COMPRESSOR MOTOR
K4	RELAY, CONDENSER FAN
L1	VALVE, SOLENOID, BY PASS
L2	VALVE, SOLENOID, PRESSURE EQUALIZER
P1	CONNECTOR, PLUG, POWER INPUT
P2	CONNECTOR, PLUG, CONTROL MODULE
P3	CONNECTOR, PLUG, EVAPORATOR FAN
P4	CONNECTOR, PLUG, COMPRESSOR
P5	CONNECTOR, PLUG, CONDENSER FAN
P6	CONNECTOR, PLUG, POWER INPUT
P7	CONNECTOR PLUG, THERMOSTATIC SWITCH
P8	CONNECTOR, PLUG, SOLENOID VALVE BY PASS
P9	CONNECTOR, PLUG, SOLENOID VALVE EQUALIZER
P10	CONNECTOR, PLUG, COMPRESSOR
R1	RESISTOR
S1	SWITCH, ROTARY SELECTOR
S2	SWITCH, TOGGLE
S3	SWITCH, TEMPERATURE CONTROL
S4	SWITCH, HIGH PRESSURE CUTOUT
S5	SWITCH, LOW PRESSURE CUTOUT
S6	SWITCH, HEATER CUTOUT
S7	SWITCH, THERMOSTATIC
T1	TRANSFORMER
TB1	TERMINAL BOARD, JUNCTION BOX
TB2	TERMINAL BOARD
TB3	TERMINAL BOARD, POWER INPUT
TB4	TERMINAL BLOCK

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FO-3. Wiring Diagram, 3 Phase, 50/60 Hertz, 208 Volts

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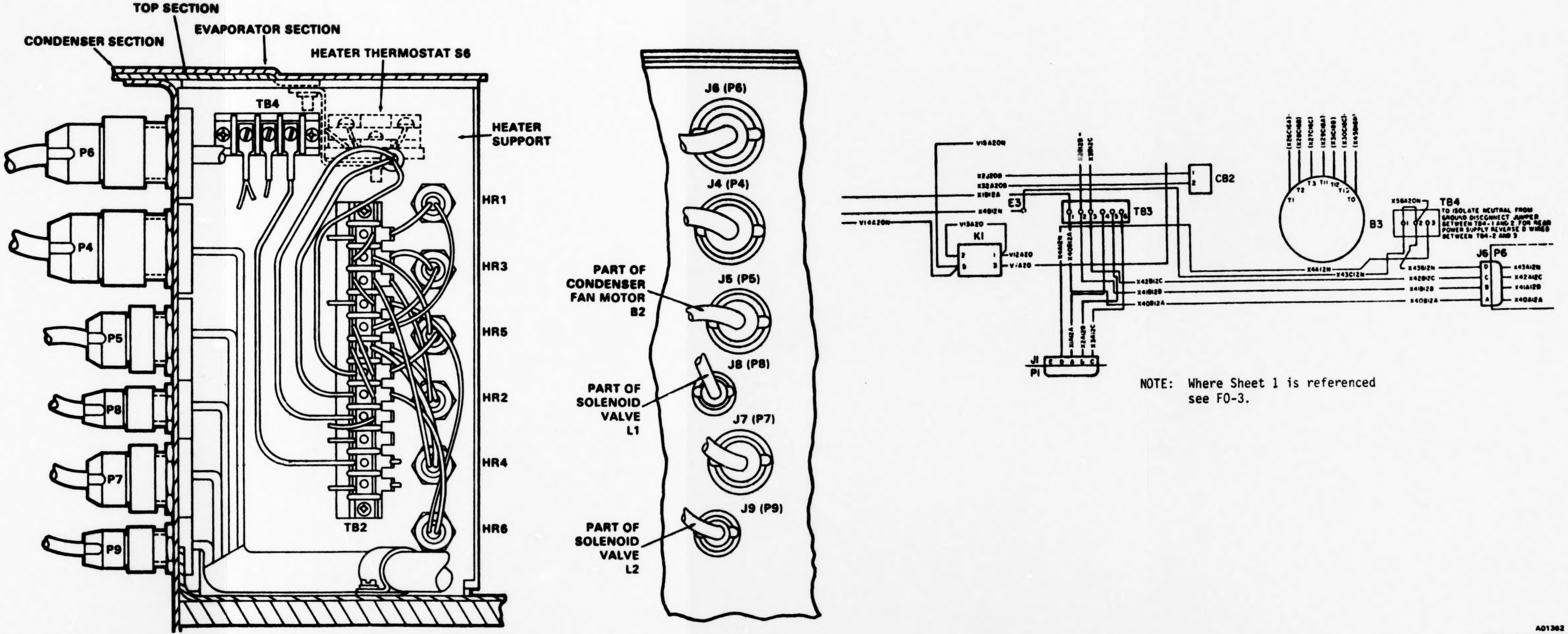
TOP SECTION
EVAPORATOR SECTION
CONDENSER SECTION
HEATER THERMOSTAT S6
TB4
HEATER SUPPORT
P6
P4
P5
P8
P7
P9
HR1
HR3
HR5
HR2
HR4
HR6
TB2
J6 (P6)
J4 (P4)
J5 (P5)
J8 (P8)
J7 (P7)
J9 (P9)
PART OF CONDENSER FAN MOTOR B2
PART OF SOLENOID VALVE L1
PART OF SOLENOID VALVE L2
V15A20N
X2J20B
X32A20B
X1B12A
X4B12N
V14A20N
V13A20
K1
V12A20
V1A20
E3
TB3
CB2
X28B12B
X38B12C
X44A12N
X40B12A
X1A12A
X2A12B
X3A12C
J1
P1
X42B12C
X41B12B
X40B12A
(X26C16A)
(X28C16B)
(X27C16C)
(X29C16A)
(X31C16B)
(X30C16C)
(X45B16N)
T1
T2
T3
T11
T12
T13
T0
B3
X58A20N
TB4
TO ISOLATE NEUTRAL FROM GROUND DISCONNECT JUMPER BETWEEN TB4-1 AND 2. FOR REAR POWER SUPPLY REVERSE D WIRES BETWEEN TB4-2 AND 3
X4A12N
X43C12N
X43B12N
J6
P6
X43A12N
X42A12C
X41A12B
X40A12A

NOTE: Where Sheet 1 is referenced see FO-3.

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FO-4. Wiring Diagram, 3 Phase, 50/60 Hertz, 208 Volts

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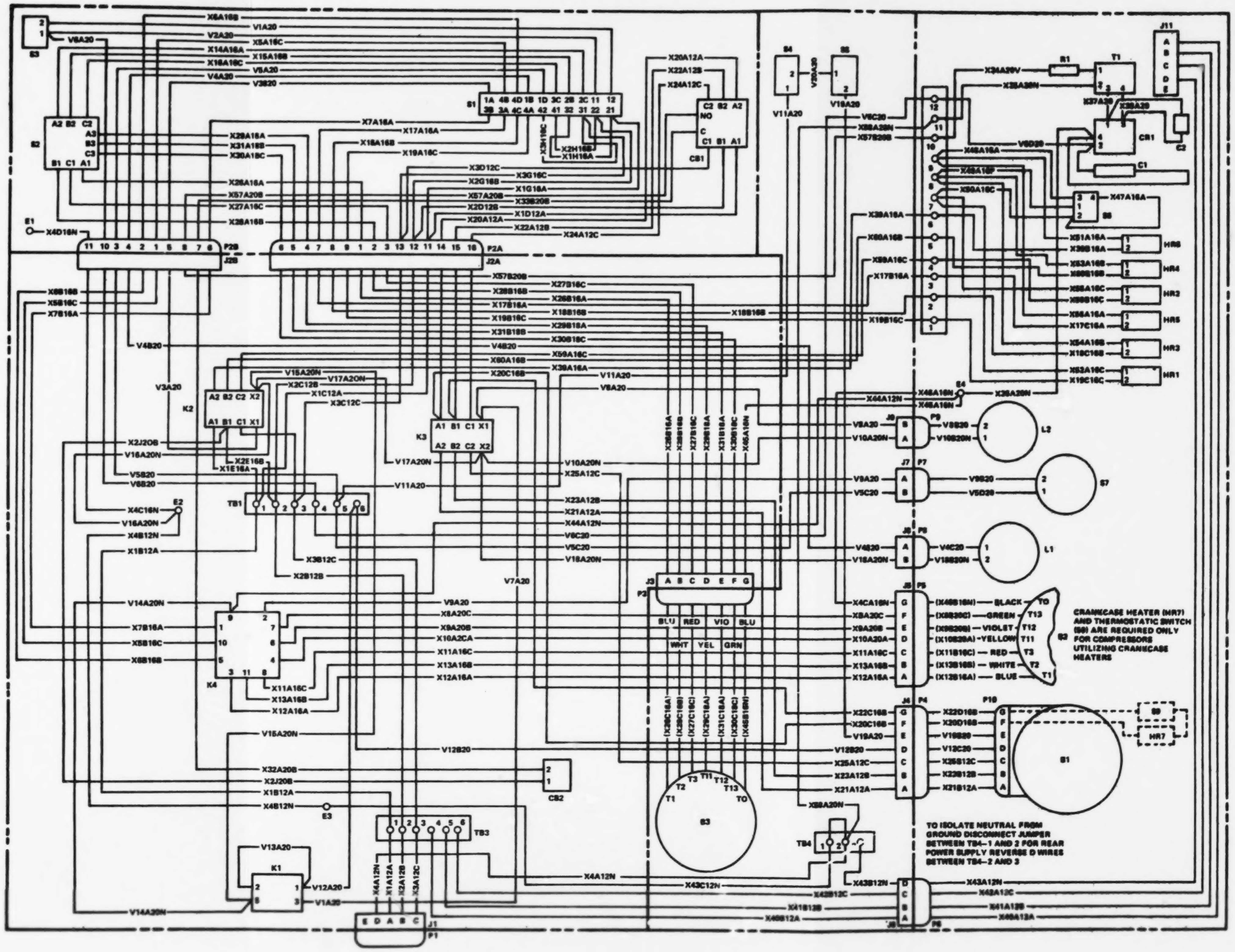
S3
S1
S2
CB1
CB2
E1
E2
E3
K1
K2
K3
K4
TB1
TB3
TB4
J1
P1
J2B
P2B
J2A
P2A
J3
P3
B3
S4
S5
J11
R1
T1
CR1
C1
C2
S6
HR1
HR2
HR3
HR4
HR5
HR6
J9
P9
L2
J7
P7
S7
J8
P8
L1
J5
P5
B2
J4
P4
P10
B1
S8
HR7
J6
P6
CRANKCASE HEATER (HR7) AND THERMOSTATIC SWITCH (S8) ARE REQUIRED ONLY FOR COMPRESSORS UTILIZING CRANKCASE HEATERS
TO ISOLATE NEUTRAL FROM GROUND DISCONNECT JUMPER BETWEEN TB4–1 AND 2 FOR REAR POWER SUPPLY REVERSE D WIRES BETWEEN TB4–2 AND 3

NOTE: Where Sheet 2 is referenced see FO-6.

COMPONENT REFERENCE LIST

ELEC REF DESIG	DESCRIPTION
B1	COMPRESSOR, ROTARY
B2	MOTOR, CONDENSER FAN
B3	MOTOR, EVAPORATOR FAN
C1	CAPACITOR, FILTER (EMI)
C2	CAPACITOR (EMI)
CB1	CIRCUIT BREAKER, COMPRESSOR
CB2	CIRCUIT BREAKER, CONTROL
CR1	RECTIFIER, SEMICONDUCTOR DEVICE
E1	TERMINAL STUD (CONTROL MODULE GRD)
E2	TERMINAL STUD (JUNCTION BOX GRD)
E3 AND E4	TERMINAL STUD (SYSTEM GRD)
HR1 THRU 6	HEATER ELEMENT
J1 AND 11	CONNECTOR, RECEPTACLE, POWER INPUT
J2	CONNECTOR, RECEPTACLE, JUNCTION BOX
J3	CONNECTOR, RECEPTACLE, EVAPORATOR FAN
J4	CONNECTOR, RECEPTACLE, COMPRESSOR
J5	CONNECTOR, RECEPTACLE, CONDENSER FAN
J6	CONNECTOR, RECEPTACLE, POWER INPUT
J7	CONNECTOR, RECEPTACLE, THERMOSTATIC SWITCH
J8	CONNECTOR, RECEPTACLE, SOLENOID VALVE BY PASS
J9	CONNECTOR, RECEPTACLE, SOLENOID VALVE EQUALIZER
J10	CONNECTOR, RECEPTACLE, COMPRESSOR
K1	RELAY, TIME DELAY
K2	RELAY, HEATER
K3	RELAY, COMPRESSOR MOTOR
K4	RELAY, CONDENSER FAN
L1	VALVE, SOLENOID, BY PASS
L2	VALVE, SOLENOID, PRESSURE EQUALIZER
P1	CONNECTOR, PLUG, POWER INPUT
P2	CONNECTOR, PLUG, CONTROL MODULE
P3	CONNECTOR, PLUG, EVAPORATOR FAN
P4	CONNECTOR, PLUG, COMPRESSOR
P5	CONNECTOR, PLUG, CONDENSER FAN
P6	CONNECTOR, PLUG, POWER INPUT
P7	CONNECTOR, PLUG, THERMOSTATIC SWITCH
P8	CONNECTOR, PLUG, SOLENOID VALVE BY PASS
P9	CONNECTOR, PLUG, SOLENOID VALVE EQUALIZER
P10	CONNECTOR, PLUG, COMPRESSOR
R1	RESISTOR
S1	SWITCH, ROTARY SELECTOR
S2	SWITCH, TOGGLE
S3	SWITCH, TEMPERATURE CONTROL
S4	SWITCH, HIGH PRESSURE CUTOUT
S5	SWITCH, LOW PRESSURE CUTOUT
S6	SWITCH, HEATER CUTOUT
S7	SWITCH, THERMOSTATIC
T1	TRANSFORMER
TB1	TERMINAL BOARD, JUNCTION BOX
TB2	TERMINAL BOARD
TB3	TERMINAL BOARD, POWER INPUT
TB4	TERMINAL BLOCK

FO-5. Wiring Diagram, 3 Phase, 400 Hertz, 208 Volts

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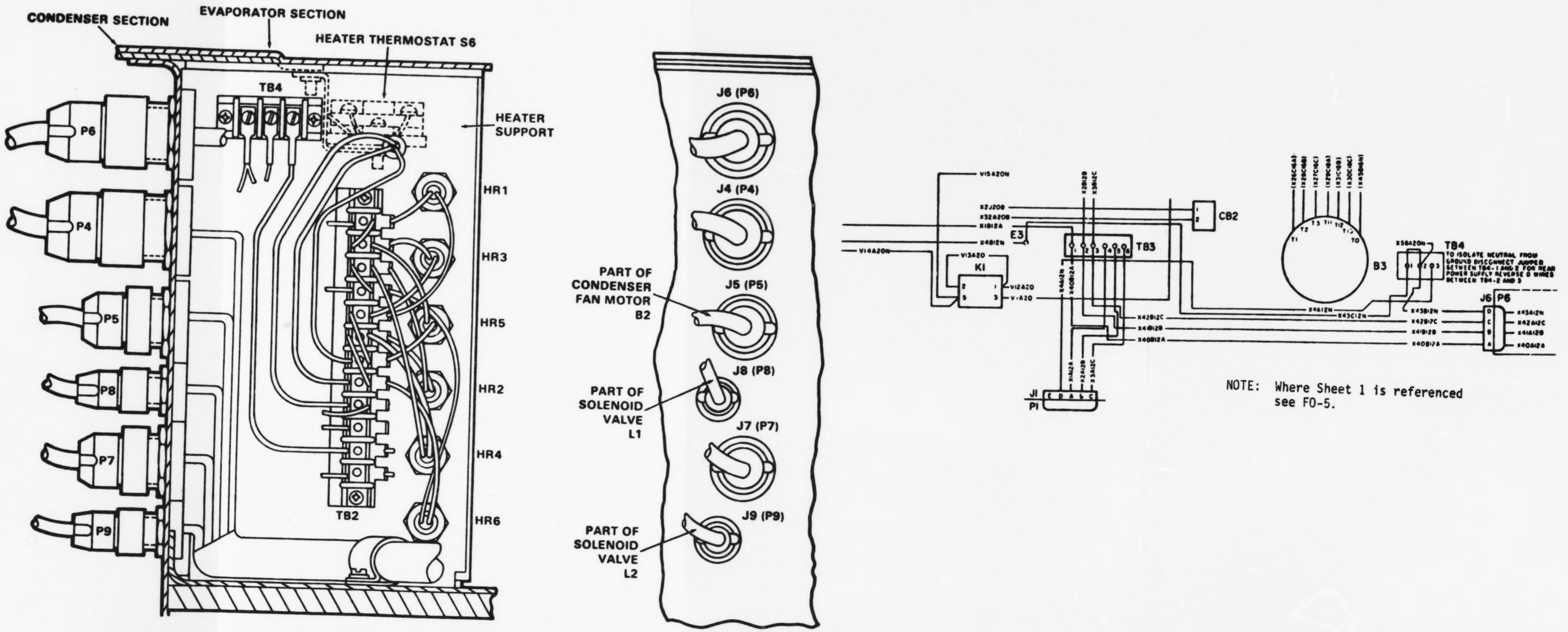
CONDENSER SECTION
EVAPORATOR SECTION
HEATER THERMOSTAT S6
TB4
HEATER SUPPORT
P6
P4
P5
P8
P7
P9
HR1
HR3
HR5
HR2
HR4
HR6
TB2
J6 (P6)
J4 (P4)
J5 (P5)
PART OF CONDENSER FAN MOTOR B2
J8 (P8)
PART OF SOLENOID VALVE L1
J7 (P7)
J9 (P9)
PART OF SOLENOID VALVE L2
V15A20N
X2J20B
X32A20B
X1B12A
E3
X4B12N
V14A20N
V13A20
K1
2
1
5
3
V12A20
V1A20
X2B12B
X3B12C
TB3
1 2 3 4 5 6
X44A12N
X40B12A
X42B12C
X41B12B
X40B12A
X1A12A
X2A12B
X3A12C
J1
P1
E D A B C
CB2
1
2
(X26C16A)
(X28C16B)
(X27C16C)
(X29C16A)
(X31C16B)
(X30C16C)
(X45B16N)
T1
T2
T3
T11
T12
T13
T0
B3
X58A20N
TB4
1 2 3
TO ISOLATE NEUTRAL FROM GROUND DISCONNECT JUMPER BETWEEN TB4-1 AND 2 FOR REAR POWER SUPPLY REVERSE D WIRES BETWEEN TB4-2 AND 3
X4A12N
X43C12N
X43B12N
X42B17C
X41B12B
X40B12A
J6
P6
D
C
B
A
X43A12N
X42A12C
X41A12B
X40A12A

NOTE: Where Sheet 1 is referenced see FO-5.

FO-6. Wiring Diagram, 3 Phase, 400 Hertz 208 Volts

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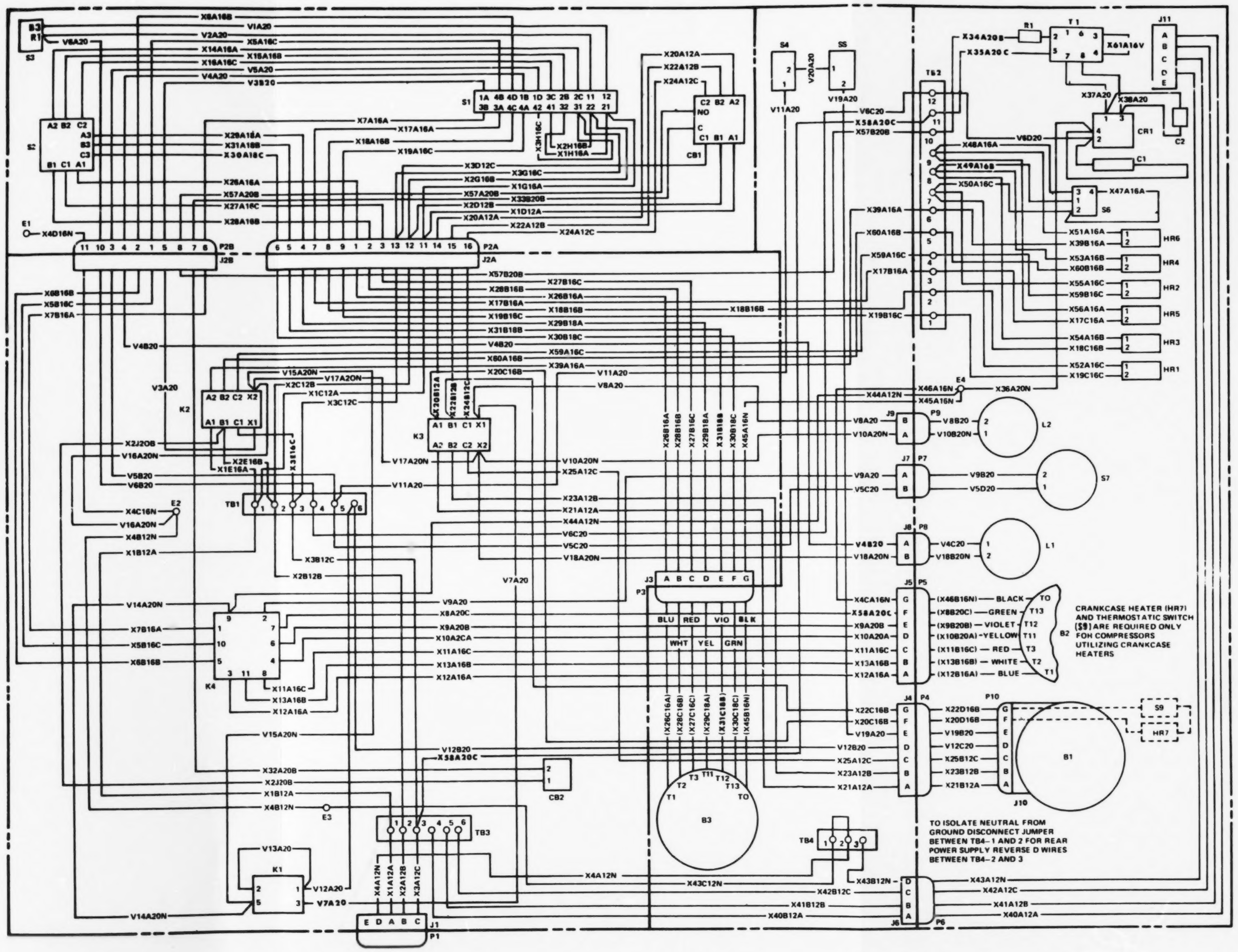
NOTE: Where Sheet 2 is referenced see FO-6.2



CRANKCASE HEATER (HR7) AND THERMOSTATIC SWITCH (S9) ARE REQUIRED ONLY FOR COMPRESSORS UTILIZING CRANKCASE HEATERS

TO ISOLATE NEUTRAL FROM GROUND DISCONNECT JUMPER BETWEEN TB4–1 AND 2 FOR REAR POWER SUPPLY REVERSE D WIRES BETWEEN TB4–2 AND 3

COMPONENT REFERENCE LIST

ELEC REF DESIG	DESCRIPTION
B1	COMPRESSOR
B2	MOTOR, CONDENSER FAN
B3	MOTOR, EVAPORATOR FAN
C1	CAPACITOR, FILTER (EMI)
C2	CAPACITOR (EMI)
CB1	CIRCUIT BREAKER, COMPRESSOR
CB2	CIRCUIT BREAKER, CONTROL
CR1	RECTIFIER, SEMICONDUCTOR DEVICE
E1	TERMINAL STUD (CONTROL MODULE GRD)
E2	TERMINAL STUD (JUNCTION BOX GRD)
E3 AND E4	TERMINAL STUD (SYSTEM GRD)
HR1 THRU 6	HEATER ELEMENT
J1 AND 11	CONNECTOR, RECEPTACLE, POWER INPUT
J2	CONNECTOR, RECEPTACLE, JUNCTION BOX
J3	CONNECTOR, RECEPTACLE, EVAPORATOR FAN
J4	CONNECTOR, RECEPTACLE, COMPRESSOR
J5	CONNECTOR, RECEPTACLE, CONDENSER FAN
J6	CONNECTOR, RECEPTACLE, POWER INPUT
J7	CONNECTOR, RECEPTACLE, THERMOSTATIC SWITCH
J8	CONNECTOR, RECEPTACLE, SOLENOID VALVE BY PASS
J9	CONNECTOR, RECEPTACLE, SOLENOID VALVE EQUALIZER
J10	CONNECTOR, RECEPTACLE, COMPRESSOR
K1	RELAY, TIME DELAY
K2	RELAY, HEATER
K3	RELAY, COMPRESSOR MOTOR
K4	RELAY, CONDENSER FAN
L1	VALVE, SOLENOID, BY PASS
L2	VALVE, SOLENOID, PRESSURE EQUALIZER
P1	CONNECTOR, PLUG, POWER INPUT
P2	CONNECTOR, PLUG, CONTROL MODULE
P3	CONNECTOR, PLUG, EVAPORATOR FAN
P4	CONNECTOR, PLUG, COMPRESSOR
P5	CONNECTOR, PLUG, CONDENSER FAN
P6	CONNECTOR, PLUG, POWER INPUT
P7	CONNECTOR, PLUG, THERMOSTATIC SWITCH
P8	CONNECTOR, PLUG, SOLENOID VALVE BY PASS
P9	CONNECTOR, PLUG, SOLENOID VALVE EQUALIZER
P10	CONNECTOR, PLUG, COMPRESSOR
R1	RESISTOR
S1	SWITCH, ROTARY SELECTOR
S2	SWITCH, TOGGLE
S3	SWITCH, TEMPERATURE CONTROL
S4	SWITCH, HIGH PRESSURE CUTOUT
S5	SWITCH, LOW PRESSURE CUTOUT
S6	SWITCH, HEATER CUTOUT
S7	SWITCH, THERMOSTATIC
T1	TRANSFORMER
TB1	TERMINAL BOARD, JUNCTION BOX
TB2	TERMINAL BOARD
TB3	TERMINAL BOARD, POWER INPUT
TB4	TERMINAL BLOCK

FO-6.1 Wiring Diagram, 3 Phase, 50/60 and 400 Hertz, 208 Volts (F18-3A and F18H-4A)

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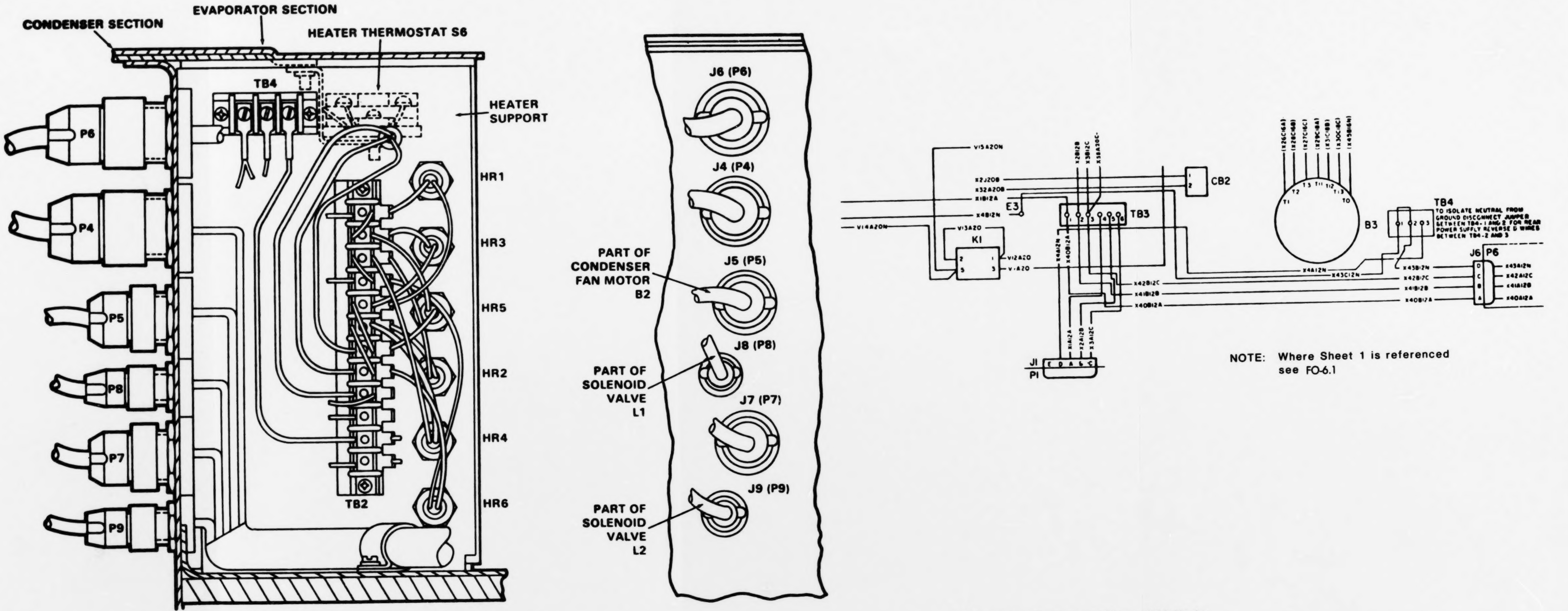
CONDENSER SECTION
EVAPORATOR SECTION
HEATER THERMOSTAT S6
TB4
HEATER SUPPORT
P6
P4
P5
P8
P7
P9
HR1
HR3
HR5
HR2
HR4
HR6
TB2
J6 (P6)
J4 (P4)
J5 (P5)
PART OF CONDENSER FAN MOTOR B2
J8 (P8)
PART OF SOLENOID VALVE L1
J7 (P7)
J9 (P9)
PART OF SOLENOID VALVE L2
V15A20N
X2J20B
X32A20B
X1B12A
X4B12N
V14A20N
E3
V13A20
K1
V12A20
V-A20
X2B12B
X3B12C
X38A20C
TB3
X4A12N
X40B12A
X1A12A
X2A12B
X3A12C
J1
P1
CB2
(X26C16A)
(X28C16B)
(X27C16C)
(X29C18A)
(X31C18B)
(X30C18C)
(X45B16N)
T1
T2
T3
T11
T12
T13
T0
B3
TB4
TO ISOLATE NEUTRAL FROM GROUND DISCONNECT JUMPER BETWEEN TB4-1 AND 2 FOR REAR POWER SUPPLY REVERSE D WIRES BETWEEN TB4-2 AND 3
X4A12N
X43C12N
X43B12N
X42B12C
X41B12B
X40B12A
J6
P6
X43A12N
X42A12C
X41A12B
X40A12A

NOTE: Where Sheet 1 is referenced see FO-6.1

FO-6.2 Wiring Diagram, 3 Phase, 400 Hertz 208 Volts (F18H-3A and F18H-4A).

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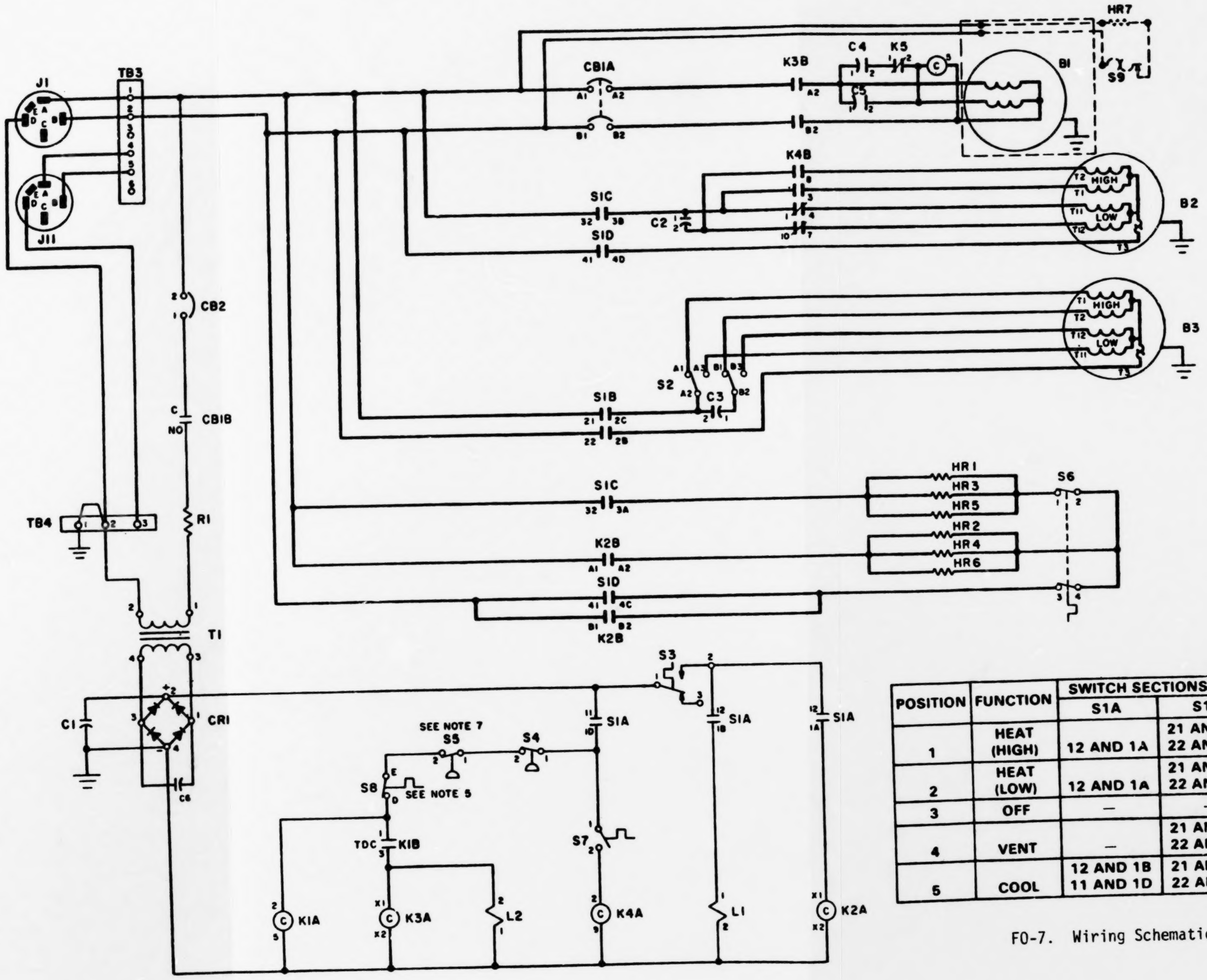
J1
TB3
J11
CB1A
A1
A2
B1
B2
K3B
C4
K5
C5
HR7
S9
B1
K4B
S1C
C2
S1D
B2
HIGH
LOW
T1
T2
T11
T12
T3
B3
S2
C3
S1B
CB2
CB1B
NO
C
R1
TB4
HR1
HR3
HR5
HR2
HR4
HR6
S6
K2B
S1D
K2B
T1
C1
CR1
C6
S3
S1A
SEE NOTE 7
S5
S4
S8
SEE NOTE 5
TDC
K1B
S7
K1A
K3A
L2
K4A
L1
K2A

POSITION	FUNCTION	SWITCH SECTIONS AND TERMINALS CONNECTED			
		S1A	S1B	S1C	S1D
1	HEAT (HIGH)	12 AND 1A	21 AND 2C 22 AND 2B	32 AND 3A	41 AND 4C
2	HEAT (LOW)	12 AND 1A	21 AND 2C 22 AND 2B	—	—
3	OFF	—	—	—	—
4	VENT	—	21 AND 2C 22 AND 2B	—	—
5	COOL	12 AND 1B 11 AND 1D	21 AND 2C 22 AND 2B	32 AND 3B	41 AND 4D

COMPONENT REFERENCE LIST

ELEC REF DESIG	DESCRIPTION
B1	COMPRESSOR, ROTARY
B2	MOTOR, CONDENSER FAN
B3	MOTOR, EVAPORATOR FAN
C1	CAPACITOR, FILTER
C2	CAPACITOR, CONDENSER RUN
C3	CAPACITOR, EVAPORATOR RUN
C4	CAPACITOR, COMPRESSOR START
C5	CAPACITOR, COMPRESSOR RUN
C6	CAPACITOR
CB1	CIRCUIT BREAKER, COMPRESSOR
CB2	CIRCUIT BREAKER, CONTROL
CR1	RECTIFIER, SEMICONDUCTOR DEVICE
HR1 THRU 6	HEATER ELEMENT
HR7	HEATER, COMPRESSOR, CRANKCASE
J1 AND J 11	CONNECTOR, RECEPTACLE, POWER INPUT
K1	RELAY, TIME DELAY
K2	RELAY HEATER
K3	RELAY, COMPRESSOR MOTOR
K4	RELAY, CONDENSER FAN
K5	RELAY, COMPRESSOR START
L1	VALVE, SOLENOID, BY PASS
L2	VALVE, SOLENOID, PRESSURE EQUALIZER
R1	RESISTOR
S1	SWITCH, ROTARY SELECTOR
S2	SWITCH, EVAPORATOR FAN
S3	SWITCH, TEMPERATURE CONTROL
S4	SWITCH, HIGH PRESSURE CUTOUT
S5	SWITCH, LOW PRESSURE CUTOUT
S6	SWITCH, HEATER THERMOSTAT
S7	SWITCH, CONDENSER FAN THERMOSTAT
S9	SWITCH, COMPRESSOR OVERLOAD (INTERNAL)
T1	TRANSFORMER
TB3	TERMINAL BOARD, POWER INPUT
TB4	TERMINAL BLOCK

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FO-7. Wiring Schematic (Single Phase)

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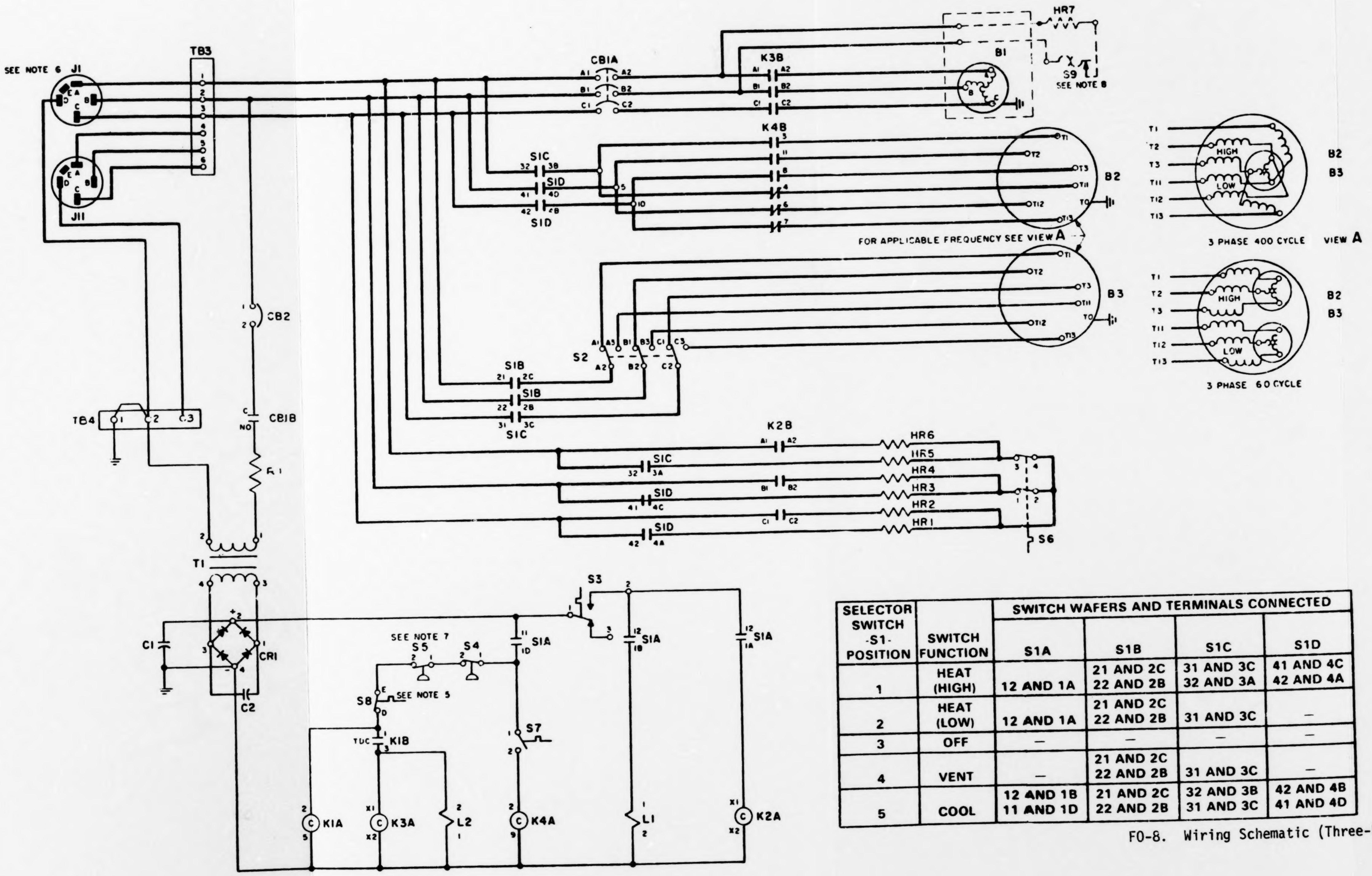

SEE NOTE 6
J1
J11
TB3
1
2
3
4
5
6
A
B
C
D
E
CB1A
A1
A2
B1
B2
C1
C2
K3B
B1
HR7
S9
SEE NOTE 8
K4B
3
11
8
4
6
7
S1C
32
3B
S1D
41
4D
42
4B
S1D
5
10
T1
T2
T3
T11
T12
T13
T0
B2
B3
FOR APPLICABLE FREQUENCY SEE VIEW A
S2
A1
A3
B1
B3
C1
C3
A2
B2
C2
S1B
21
2C
S1B
22
2B
31
3C
S1C
CB2
TB4
1
2
3
C
NO
CB1B
R1
K2B
A1
A2
HR6
HR5
S1C
32
3A
HR4
B1
B2
S1D
41
4C
HR3
HR2
C1
C2
S1D
42
4A
HR1
S6
T1
C1
CR1
C2
S3
SEE NOTE 7
S5
S4
S1A
11
1D
12
1B
12
1A
S8
E
D
SEE NOTE 5
TDC
K1B
S7
K1A
K3A
L2
K4A
L1
K2A
X1
X2
HIGH
LOW
3 PHASE 400 CYCLE
VIEW A
3 PHASE 60 CYCLE

SELECTOR SWITCH -S1- POSITION	SWITCH FUNCTION	SWITCH WAFERS AND TERMINALS CONNECTED			
		S1A	S1B	S1C	S1D
1	HEAT (HIGH)	12 AND 1A	21 AND 2C 22 AND 2B	31 AND 3C 32 AND 3A	41 AND 4C 42 AND 4A
2	HEAT (LOW)	12 AND 1A	21 AND 2C 22 AND 2B	31 AND 3C	—
3	OFF	—	—	—	—
4	VENT	—	21 AND 2C 22 AND 2B	31 AND 3C	—
5	COOL	12 AND 1B 11 AND 1D	21 AND 2C 22 AND 2B	32 AND 3B 31 AND 3C	42 AND 4B 41 AND 4D

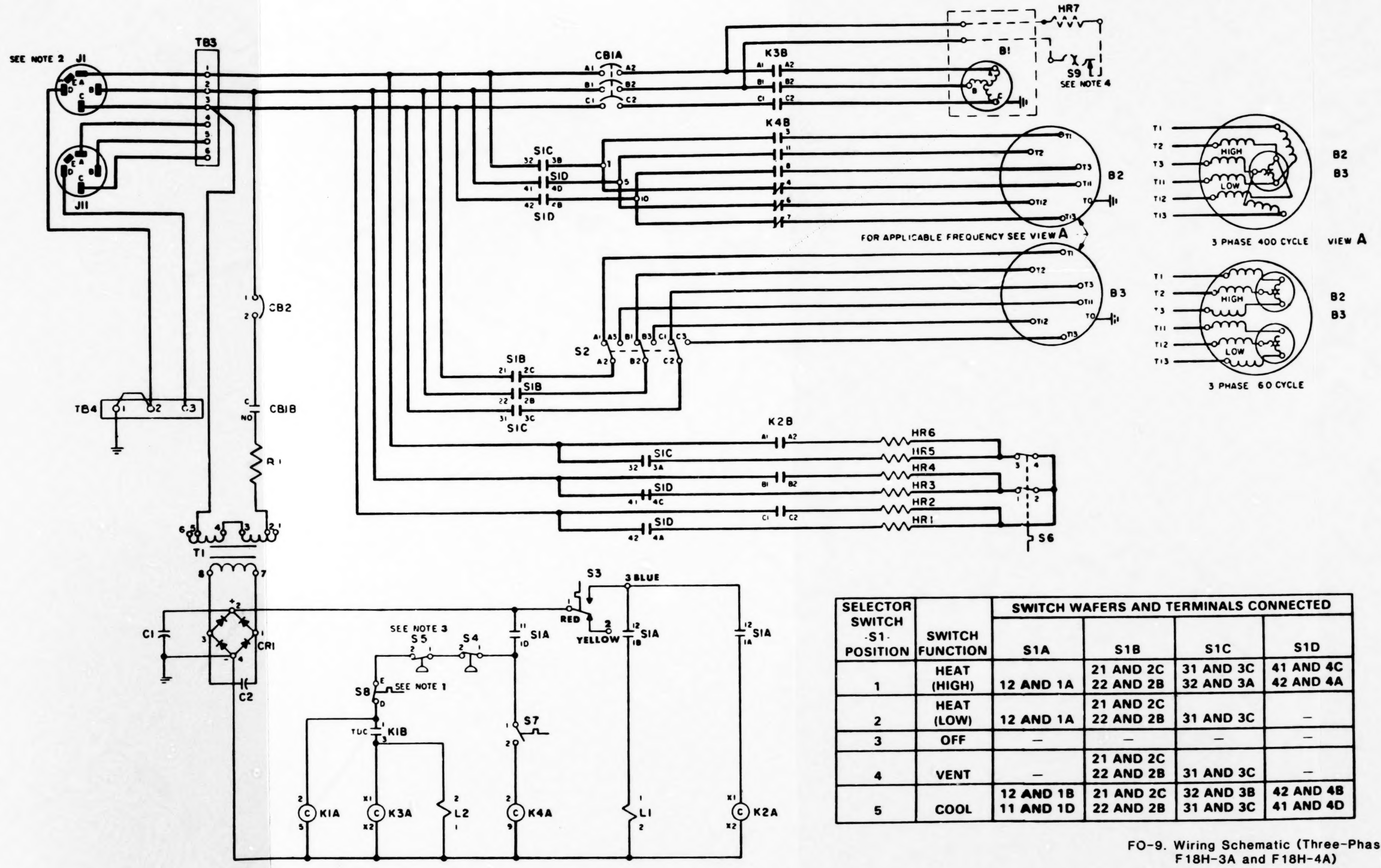
COMPONENT REFERENCE LIST

ELEC REF DESIG	DESCRIPTION
B1	COMPRESSOR
B2	MOTOR, CONDENSER FAN
B3	MOTOR, EVAPORATOR FAN
C1	CAPACITOR, FILTER (EMI)
C2	CAPACITOR, FILTER (EMI)
CB1	CIRCUIT BREAKER, COMPRESSOR
CB2	CIRCUIT BREAKER, CONTROL
CR1	RECTIFIER
HR1 THRU 6	HEATER ELEMENT
HR7	HEATER, COMPRESSOR CRANKCASE
J1 AND J11	CONNECTOR, POWER INPUT
K1	RELAY, TIME DELAY
K2	RELAY, HEATER
K3	RELAY, COMPRESSOR
K4	RELAY, CONDENSER FAN
L1	VALVE, SOLENOID, BYPASS
L2	VALVE, SOLENOID, EQUALIZER
R1	RESISTOR
S1	SWITCH, ROTARY SELECTOR
S2	SWITCH, EVAPORATOR FAN
S3	SWITCH, TEMPERATURE CONTROL
S4	SWITCH, HIGH PRESSURE CUTOUT
S5	SWITCH, LOW PRESSURE CUTOUT
S6	SWITCH, HEATER THERMOSTAT
S7	SWITCH, CONDENSER FAN THERMOSTAT
S9	SWITCH, COMPRESSOR OVERLOAD (INTERNAL)
T1	TRANSFORMER
TB3	TERMINAL BOARD, POWER INPUT
TB4	TERMINAL BOARD

FO-8. Wiring Schematic (Three-Phase)

A01358
TM5 4120 367 14 108

best copy available


SEE NOTE 2 J1
J11
TB3
TB4
CB1A
K3B
K4B
B1
HR7
S9
SEE NOTE 4
B2
B3
FOR APPLICABLE FREQUENCY SEE VIEW A
3 PHASE 400 CYCLE
VIEW A
3 PHASE 60 CYCLE
HIGH
LOW
S1C
S1D
S1B
S2
CB2
CB1B
R1
T1
K2B
HR6
HR5
HR4
HR3
HR2
HR1
S6
C1
CR1
C2
S3
3 BLUE
RED
YELLOW
S1A
SEE NOTE 3
S5
S4
S8
SEE NOTE 1
K1B
S7
K1A
K3A
L2
K4A
L1
K2A

NOTES:

1. THERMAL SWITCH S8 IS PART OF COMPRESSOR MOTOR B1.
2. INPUT PHASE ORIENTATION FOR MAIN POWER RECEPTACLE J1 AND AUXILIARY POWER RECEPTACLE J11 SHALL BE AS FOLLOWS:

   PIN A - PHASE A

   PIN B - PHASE B

   PIN C - PHASE C

   PIN D - GROUND
3. SWITCH (S5) IS SHOWN IN PRESSURE ENERGIZED POSITION.
4. CRANKCASE HEATER (HR7) AND THERMOSTATIC SWITCH (S9) ARE REQUIRED ONLY FOR COMPRESSORS UTILIZING CRANKCASE HEATERS.

SELECTOR SWITCH ·S1· POSITION	SWITCH FUNCTION	SWITCH WAFERS AND TERMINALS CONNECTED			
		S1A	S1B	S1C	S1D
1	HEAT (HIGH)	12 AND 1A	21 AND 2C 22 AND 2B	31 AND 3C 32 AND 3A	41 AND 4C 42 AND 4A
2	HEAT (LOW)	12 AND 1A	21 AND 2C 22 AND 2B	31 AND 3C	—
3	OFF	—	—	—	—
4	VENT	—	21 AND 2C 22 AND 2B	31 AND 3C	—
5	COOL	12 AND 1B 11 AND 1D	21 AND 2C 22 AND 2B	32 AND 3B 31 AND 3C	42 AND 4B 41 AND 4D

COMPONENT REFERENCE LIST

ELEC REF DESIG	DESCRIPTION
B1	COMPRESSOR
B2	MOTOR, CONDENSER FAN
B3	MOTOR, EVAPORATOR FAN
C1	CAPACITOR, FILTER (EMI)
C2	CAPACITOR, FILTER (EMI)
CB1	CIRCUIT BREAKER, COMPRESSOR
CB2	CIRCUIT BREAKER, CONTROL
CR1	RECTIFIER
HR1 THRU 6	HEATER ELEMENT
HR7	HEATER, COMPRESSOR CRANKCASE
J1 AND J11	CONNECTOR, POWER INPUT
K1	RELAY, TIME DELAY
K2	RELAY, HEATER
K3	RELAY, COMPRESSOR
K4	RELAY, CONDENSER FAN
L1	VALVE, SOLENOID, BYPASS
L2	VALVE, SOLENOID, EQUALIZER
R1	RESISTOR
S1	SWITCH, ROTARY SELECTOR
S2	SWITCH, EVAPORATOR FAN
S3	SWITCH, TEMPERATURE CONTROL
S4	SWITCH, HIGH PRESSURE CUTOUT
S5	SWITCH, LOW PRESSURE CUTOUT
S6	SWITCH, HEATER THERMOSTAT
S7	SWITCH, CONDENSER FAN THERMOSTAT
S9	SWITCH, COMPRESSOR OVERLOAD (INTERNAL)
T1	TRANSFORMER
TB3	TERMINAL BOARD, POWER INPUT
TB4	TERMINAL BOARD

FO-9. Wiring Schematic (Three-Phase F18H-3A and F18H-4A)

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